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EDITOR'S COMMENTS

THIS is a year when fishing, a subject which has been long neglected on the maritime scene, seems to be coming into its own. Thus, the Old Dartmouth Whaling Museum at New Bedford is featuring an exhibit dealing with New Bedford's fishing industry, while similar smaller exhibits concerned with aspects of the Fisheries are being mounted at both Mystic Seaport and at the Maine Maritime Museum in Bath. Our own Peabody Museum, in line with these efforts, late this spring is also organizing an exhibit of marine paintings collected by Russell W. Knight illustrating all aspects of the New England fishing industry.

A number of the articles in this issue of the *Neptune* reinforce this trend. The first by Wayne M. O'Leary concerns itself with the design and construction of Maine fishing schooners just before and after the Civil War. In this article O'Leary explains why these schooners, during these years, differ considerably from those built to the south in Massachusetts and further down east in Nova Scotia. In so doing, he stresses both economic and environmental factors and rescues a little known Maine ship type from oblivion. The story is then continued by Andrew W. German who explains how Otter Trawling was introduced from England, first to Pacific waters, and then, thanks to the Bay State Fishing Company, between 1905 and 1938 became the principal method of catching fish off our shores. He points out, however, that it never was too successful from a financial point of view and had some possible adverse ecological results. Finally, the Book Review Section contains a long review of that remarkable book by William Warner, entitled *Distant Waters* which tells the story of those giant foreign factory ships which operated off our New England shores and threatened to permanently deplete our fishing stocks until the proclamation of the 200 mile limit a few years ago stopped their activities once and for all.

Other articles in this issue strike a very different note. Wilcomb E. Washburn explains how close the Prime Meridian came to being run through the Canary Islands and why this failed to occur, which should be of interest to those concerned with marine cartography. That enthusiastic Nantucketer, Edouard E. Stackpole, tells the story of how a fellow islander, Lt. Alexander Pinkham, managed to have the cottage which was John Paul Jones' birthplace in Scotland repaired.

Then turning to a much earlier period of maritime history, Miles W. Campbell carefully assays evidence as to the size of the invasion force which Harald Hardrada mustered to invade England in 1066. He not only shows it was larger than many authorities believe, but reveals how it helped the smaller force of William the Conqueror prevail a little later the same year over his Saxon rival, Harold Godwinson.

Finally, in an article entitled, 'Into the Ocean World' William Fowler and Jay Kaufman describe a unique multi-disciplinary course that has been given during these last few years in the Boston area which makes use of interestingly new teaching techniques to present marine studies in a different way. It is the first of a series of articles we hope to run in subsequent issues exploring ways in which academic institutions and museums can effectively teach a wide public about maritime matters.

The editor wishes, however, to close these comments on a somewhat different note. We are all pleased that early this summer the tall ships will be arriving in Quebec to celebrate the 450th anniversary of the discovery of the Saint Lawrence and that in June they will be visiting Boston again for the first time since 1980. Such visits, like America Cup races, dramatize the sea for us all and help us to be proud of our maritime heritage. May these ships continue their visits in future years and thrill us with their majesty under sail.

ARCHIBALD R. LEWIS

Salem, Massachusetts

The Canary Islands and the Question of the Prime Meridian: The Search for Precision in the Measurement of the Earth

By Wilcomb E. Washburn

THE prime or first meridian (*primus meridianus*) is an arbitrary line, one from which chart makers and map makers can begin to measure and to count longitudinal distance on the face of the globe. The system of determining terrestrial location by latitude and longitude measurements goes back to the Greek mathematicians and geographers, Eratosthenes and Hipparchus, and was first incorporated in a form that has come down to us in Ptolemy's *Geography*. Although Ptolemy's astronomical work was conducted in Alexandria, he chose the Fortunate Islands (the Canaries) as the physical location of the prime meridian from which point he measured and laid down the roughly 180° of the world known to the ancients. Ptolemy's purpose was to create an accurate grid system upon which the location of individual cities from the farthest known land west to the farthest known land east could be accurately placed. Unfortunately (or rather fortunately, as far as Columbus was concerned), Ptolemy exaggerated the eastward extension of Asia so that, even though he placed the Canaries about seven degrees too far east, he reduced the distance a mariner would have to sail between western Europe and eastern Asia to what Columbus regarded as a manageable distance.[1] The distance between those points—the extent of the unknown world—was a matter of critical importance to Columbus. It is not surprising, therefore, that Columbus should have taken off from the Canaries in his voyages across the unknown. (This is not to ignore the importance of the prevailing wind patterns, nor is it to ignore Columbus's possible romantic interest in Doña Beatriz de Peraza y Bobadilla as additional reasons for beginning his four voyages in the Canaries.)

The need for precision in determining the longitude of the lands in the Ocean Sea to the west of Europe was emphasized by Pope Alexander VI's 1493 bull laying down a line of demarcation between authorized Spanish and Portuguese discoveries 100 leagues west of the Azores and the Cape Verde Islands. After protests by Portugal, this line was shifted in accordance with the provisions of the Treaty of Tordesillas between Spain and Portugal to a meridian 370° west of the Cape Verde Islands.[2] The controversy over where the line fell—on both sides of the world—bedeviled relations between the two powers for over a century.

When Columbus passed the point of no magnetic declination in the ship's compass, he started cartographers on a vain quest for a stable isogonic zero meridian (or line showing no magnetic variation). Many cartographers in the sixteenth century began to run the prime meridian through the Azores rather than through the Canary Islands. By mid-century, Mercator had abandoned the Ptolemaic prime meridian in favor of a meridian based on the point at which the compass showed no variation. This line was not certainly established. In Mercator's 1554 map of Europe the prime meridian is still located near Ferro, the westernmost of the Canary Islands, but many map makers ran the new prime meridian through the Azores, as did Hondius in his 1601 terrestrial globe, 'because there the compass needle points due north,' as he noted in an inscription on the globe.

But it was increasingly apparent that the line of no magnetic variation was not consistent with a true meridian. The search for precision led once more to the Canaries. Johan Blaeu, on his 1622 globe, noted in an inscription that the search for a meridian through the compass needle was 'a delusion' proved by the fact that 'it varies along the same meridian accord-

1. Wilcomb E. Washburn, 'Japan on Early European Maps,' *Pacific Historical Review*, XXI, No. 3 (August 1952), 221-36; Emerson D. Fite and Archibald Freeman (comp. and ed.), *A Book of Old Maps Delineating American History from the Earliest Days down to the Close of the Revolutionary War* (Cambridge: Harvard University Press, 1926, reprinted New York: Arno Press, 1969), pp. 1-2.

2. Derek Howse, *Greenwich Time and the Discovery of the Longitude* (Oxford: Oxford University Press, 1980), p. 127; Lucie Lagarde, 'Historique du problème du Méridien origine en France,' *Revue d'histoire des sciences et de leurs applications* 32 (Paris, 1979), 289-304, at 291.

ing as it is near one land mass or another.' Therefore,

> we, following in the steps of Ptolemy, have chosen the same islands and in them Juno, commonly called Tenerife, whose lofty and steep summit covered with perpetual cloud, called by the natives El Pico, shall mark the prime meridian. In that way we have differed barely a quarter of a degree from the longitude of the Arabs who chose the extreme western shore of Africa, . . .

According to the English scholar W. G. Perrin, 'Here we have what appears to be the first attempt to fix the meridian as passing through a precise geographical spot instead of vaguely through an island or group of islands.'[3] In Blaeu's *Le Grand Atlas* (Amsterdam 1663, facsimile edition in 12 volumes, Theatrum Orbis Terrarum, Amsterdam, 1967), in Chapter VIII Blaeu discusses the uncertainty and lack of agreement over the placement of the prime meridian, some following Ptolemy, some the marine compass's line of no magnetic declination. Blaeu here buttresses his argument with the authority of the mathematician of Bruges, Simon Stevin. It is necessary, Blaeu asserted, to select a place 'fixé et arresté.' And since one such place exists in one of the Canaries, it should be chosen. The choice (quoting Simon Stevin) he concluded, should be Pico de Teide. He describes the mountain as rising rapidly from a large base to a very sharp point like a sugar loaf. Thus we have, in Tenerife, he wrote, 'la plus grande, la plus riche, et la plus excellente des sept Isles de Canarie. S'il y a quelqu'un qui trouve un autre lieu plus propre en tout l'Univers, ce sera judicieusement fait de le choisir. Mais en quel lieu que ce soit, que le choix se face, il faut eviter l'ambiguité dont nous avons parlé.'[4]

The wonders of El Pico were often sung in the literature of the period. R. Stafforde, in *A Geographicall and Anthologicall Description of all the Empires and Kingdomes, both of Continent and Islands in this terrestriall Globe* (London, 1634) wrote of 'Tanariffa, wherein is a Mountaine so high, that the inhabitants have all their fresh water from a Cloud that droppeth there very fast, hanging about a tree.'[5] The story of the miraculous tree of Tenerife was a staple item in descriptions of the Canaries for centuries.

The authors of the *Thesaurus Geographicus: A New Body of Geography; or, A Compleat Description of the Earth* (London, 1695), describe El Pico as 'thought to be the highest mountain in the World, the top of it may be seen distinctly enough at Sea, at the distance of 292 *English* miles; one cannot go up to it, except in the months of *July* and *August;* for all the rest of the Year it is cover'd with Snow, though Snow never falls, neither in *Teneriff,* nor in any other of the Canary-Ilands.'[6]

The most prestigious confirmation of the legitimacy of the Canaries as the site of the prime meridian was the decree of Louis XIII, published on 1 July 1634, declaring, after having convened a panel of scientists to recommend the appropriate location of a prime meridian, that it should run through the Canaries, and in particular through the 'l'ile de Fer' (Hierro or Fero). The decree cited not only the authority of Ptolemy, but also that of Andres Garcia de Cespedes, whose *Regimiento de Navegacion* (Madrid, 1601), Chapter 52 spoke of 'el Meridiano fixo que passa por las Canarias, de donde comunmente se cuentan las longitudines.' Louis XIII directed that French ships not attack Spanish or Portuguese ships in waters lying east of the prime meridian and north of the Tropic of Cancer, and, in order that all should be aware of the geographical areas involved, he forbade 'all pilots, hydrographers, designers or engravers of maps or terrestrial globes to innovate or vary from the ancient meridian passing through the most westerly of the Canary Islands, without regard to the novel ideas of those who have recently fixed it in the Azores on the supposition that there the compass does not vary, for it is certain that this happens also in other places that have never been taken for the meridian.'[7]

It was appropriate that the prime meridian ran through the Canaries through much of the modern world's history, as Jean-Joseph La Montre wrote in 1702, because the Canaries form the natural division between the old world and the new. Look at a world map, La Montre noted, and see that it is the most natural and most favorable disposition for a prime meridian that it is possible to choose. La Montre noted that Cardinal Richelieu did not feel it necessary to the interests of the King or of the

3. W. G. Perrin, 'The Prime Meridian,' *The Mariner's Mirror* 13 (London, 1927), 109-24, at 116-18.

4. Johan Blaeu, *Le Grand Atlas ou Cosmographie Blaviane* (Amsterdam, 1663, facsimile edition in 12 vols., Amsterdam: Theatrum Orbis Terrarum, 1967), Chap. viii; Simon Stevin, *Les Oeuvres Mathematiques de Simon Stevin de Bruges* . . . par Albert Girard (Leyden, 1634), p. 105.

5. R. Stafforde, *A Geographicall and Anthologicall Description of all the Empires and Kingdomes, both of Continent and Islands in this terrestriall Globe* (London, 1634), pp. 36-37.

6. *Thesaurus Geographicus: A New Body of Geography; Or, A Compleat Description of the Earth. . . . Collected with great care from the most approved Geographers and Modern Travellers and Discoveries, by several hands* (London, 1695), Chap. iii, p. 9.

7. Lagarde, 'Historique du problème du Méridien,' p. 293; Perrin, 'The Prime Meridian,' p. 119; Andres Garcia de Cespedes, *Regimiento de Navegacion* (Madrid, 1601), Chap. 52.

State to require that a prime meridian based on astronomical observations run through Paris. Just as Ptolemy had made his astronomical observations in Alexandria while choosing the Canaries as the geographical site of the prime meridian, so Richelieu felt it logical to make the distinction between astronomical and geographical uses of a prime meridian.[8]

This distinction between a 'meridien d'observation' (on which observatories were established) and a 'meridien de compte (universel)' or meridian of calculation or reckoning, marking the zero of longitude, was later emphasized at nineteenth-century conferences on the meridian question, for example, by Colonel Wauwermans at Antwerp in 1882 and by M. Thury at Geneva in 1883.

On the other hand, Perrin is more cynical about Richelieu's motives, rejecting the claim of scientific 'disinteredness' made for him and attributing the choice of the Canaries to the practical need to fix a clear line of demarcation for the hostilities going on at sea with Spain against whom open war had been declared the preceding May. 'The abstract devotion to science of which so much was made in 1884 [at the Washington Conference],' in Perrin's words, 'was an acquired merit.' It was merely another case of 'no peace beyond the line.'[9]

With the creation of the royal Académie des Sciences in 1666, France began a program of research in astronomy, geodesy and cartography. Scholars from other countries, like the Italian Cassini, were brought to France. A program of mapping the king's realms was undertaken in 1680 by the order of Louis XIV by two members of the Academy of Sciences, Jean Picard and de la Hire. Their work was based on observations made at the Paris Observatory founded in 1667. Their report of 1682 stated 'we thought we had better not mark the longitudes as they are ordinarily shown on maps, commencing from the Isle of Ferro as has been decreed, because we did not know the position of this island in respect to the Observatory.'[10]

Although the Royal Society of London for Improving Natural Knowledge—the British equivalent of the French Académie des Sciences—had been founded (in 1662) by Charles II four years earlier than the French Académie it was not until the French interest in 'finding the longitude' had communicated itself to King Charles through his French mistress, Louise de Keroualle (1649-1734), that the British took the decisive steps that led to the creation of the Greenwich Observatory, leading to its ultimate designation as the site of the world's prime meridian. Derek Howse tells the story in his *Greenwich Time and the Discovery of the Longitude* (New York: Oxford University Press, 1980). Louise, created Duchess of Portsmouth after her naturalization in 1673, did not personally champion the search but acted as the patron of Le Sieur de St. Pierre, a Frenchman at the English court, who claimed to have a method for the discovery of the longitude. Through constant importuning of the Duchess, he obtained an opportunity to present his plan to a distinguished group of English scientists in 1675. In the process the King was fully informed of French efforts to survey France and determine longitude and signed a royal warrant 4 March 1675, appointing John Flamsteed his 'astronomical observator,' charging him with finding the longitude, and authorizing the creation of the Greenwich Observatory. Flamsteed demolished St. Pierre's theory in the process and began England's march to scientific preeminence in navigation.[11]

Meanwhile the French were making efforts to measure the difference in longitude between the Paris Observatory and Ferro. The uncertainty seemed to be resolved by the geographer Guillaume Delisle (1675-1726) in 1700 in an article in the *Journal des scavans* and, again, in 1722, in a memoire entitled *Détermination géographique de la situation et de l'étendue des différentes parties de la Terre*. In this latter work, Delisle justified 'ce chiffre rond de 20°' as the longitude of Ferro even though others had found it a few minutes off.[12]

Delisle's figure was generally adopted despite the fact that a 1724 geodesic mission sent to the Island of Ferro under the leadership of Father Louis Feuillée, of Marseilles, obtained the result of 19°55′3″ west of Paris.[13] Although corrected by a later expedition, in 1789, which placed the Island of Ferro definitively at 20°31′ from Paris, causing Delisle's prime meridian to fall between the islands of Gomera and Palma, Delisle's convenient calculation tended to remain in use.

8. Lagarde, 'Historique du problème du Méridien,' p. 297.

9. Perrin, 'The Prime Meridian,' p. 119; The conferences at which the issue was previously discussed are recorded in *Septième Conférence Géodésique Internationale tenue à Rome en Octobre 1883: Rapport sur l'unification des longitudes par l'adoption d'un premier méridien unique et sur l'introduction d'une heure universelle* (Rome: Imprimerie Royale, 1883), pp. 1-29; Bouthillier de Beaumont, *Dissertation sur l'adoption d'un méridien initial unique présentée au Congrès Géographique de Nancy* (Nancy: Imprimerie Berger-Levrault et Cie, 1880), pp. 1-19.

10. Perrin, 'The Prime Meridian,' p. 120.

11. Howse, *Greenwich Time*, pp. 19-30.

12. Lagarde, 'Historique du problème du Méridien,' pp. 296-98.

13. Ibid., p. 298; Alfredo Herrera Piqué, 'Estancia en las Islas Canarias de Louis Feuillée, Pionero de la Exploración Científico-Natural de este Archipielago (1724),' in Francisco Morales Padron (ed.), *IV Coloquio de Historia Canario-Americana (1980)*, 2 Vols. (Gran Canaria, 1982), II, 741-61.

But, as more and more national observatories opened, new prime meridians, based on different world capitals, came into use. Delisle's prime meridian in Ferro came under question. As M. Janssen, the French delegate to the Washington Conference for Fixing a Prime Meridian and a Universal Day, held in October 1884, noted, the 20° line of Delisle 'ceased to be neutral and became merely the meridian of Paris disguised, as has been truly said, and the English, notably, never adopted it.'[14] On English charts of the early eighteenth century the zero meridian is usually the Lizard, or London, or sometimes Ferro. By the middle of the eighteenth century, Greenwich begins to be substituted on English charts. With the publication of the tables in the British Nautical Almanac in 1767 based on the Greenwich Observatory more and more nations, including the United States, began to utilize Greenwich as the prime meridian.[15]

The confusion and uncertainty caused by numerous and conflicting prime meridians on the charts of the world led, in the nineteenth century, to an attempt to obtain international agreement upon a 'neutral' prime meridian, one not identified with any particular country. The proposal of H. Bouthillier de Beaumont, Président of La Société de Géographie de Genève, in his *Choix d'un Méridien Initial Unique* (Geneva, 1880), for a prime meridian splitting the North American and Asian continents in the Bering Straits and running through the largely open Pacific Basin, found increasing favor with those, particularly French, who perceived an overwhelming predilection on the part of others to select Greenwich from among the national meridians, should such a choice eventually be made among existing national meridians.

Professor Piazzi Smyth, Astronomer Royal for Scotland, on the other hand, advocated a prime meridian based on the Great Pyramid at Gizeh. Professor Smyth, in his contribution to the Report of Committee on Standard Time and Prime Meridian, International Institute for Preserving and Perfecting Weights and Measures, published under the title, *What Shall be the Prime Meridian for the World?* (Cleveland, Ohio, June 1884), noted that 'The meridian of the Great Pyramid passes over solid, habitable, and for ages inhabited, land through nearly the whole of its course from north to south. Its line is capable therefore of being laid out along almost all that distance by trigonometrical measurement, and marked by masonried station signals; and that is the only unquestionably accurate, permanent and sufficiently visible method of setting forth the one base for longitude measuring in the future before all varieties of men.' Smyth noted that the Great Pyramid 'is acknowledged to be still, above its other high fulfillings, the grandest as well as best built surveying station-mark and monument that has ever been erected the whole world over.' Smyth also noted its closeness to Jerusalem, close to which a prime meridian for the whole world ought to lie. Evoking the Second Coming of Christ, Professor Smyth asked, 'Who is there of Adamic descent, that has once learned "to call on the name of the Lord," who would try to group mankind in these latter days round a totally different center, and make them look to the opposite side of the earth?'[16]

In 1856 Smyth conducted an expedition to the Canaries, specifically to Tenerife, 'to ascertain how much astronomical observations may be benefitted, by eliminating the lower third or fourth part of the atmosphere.' Smyth was supported by a £500 grant from the Admiralty. During sixty-five days at Tenerife Smyth established two high-altitude observing stations, one on the summit of Guajara, and the other at Alta Vista. In addition to his formal report on the expedition, Smyth wrote a popular book on the expedition called *Teneriffe: An Astronomer's Experiment: or Specialties of a Residence above the Clouds* (London: L. Reeve, 1858), in which he concluded, 'We wonder how long the learned world will delay to occupy a station, that promises so well, for greatly advancing the most sublime of the sciences.'[17]

A hundred years later, in 1959, a permanent observatory was established at Tenerife. The Spanish Ministry of Education founded the Observatorio del Teide at Izana, from where the ruins of Smyth's observatory are visible. In 1973 the Observatorio del Teide became associated with the University of La Laguna as the Instituto Universitario de Astrofisica. In 1975 this became the Instituto de Astrofisica de Canarias. The Canaries have become the site of increasing interest on the part of astronomers.[18]

There were many of Adamic descent who did not agree that a prime meridian should be near Jerusalem or

14. Forty-eighth Congress, 2d Session, House of Representatives, Ex. Doc. No. 14, *International Conference held at Washington for the Purpose of Fixing a Prime Meridian and a Universal Day, October 1884. Protocols of the Proceedings* (Washington, 1884), pp. 1-117, at p. 34.

15. Howse, *Greenwich Time*, pp. 129-131.

16. *What Shall be the Prime Meridian for the World? Report of Committee on Standard Time and Prime Meridian, International Institute for Preserving and Perfecting Weights and Measures* (Cleveland, Ohio, June, 1884, pp. 1-56), at pp. 11-13.

17. Quoted in Anthony W. Jones, 'The Canary Islands: An Astronomer's Experiment,' *Sky and Telescope* 62, No. 3 (Cambridge, Mass., September 1981), 199-201.

18. Ibid.

through Tenerife. Professor Janssen, Director of the Physical Observatory of Paris, speaking at the 1884 Washington Conference 'con calorosa eloquencia,' as one of the Spanish delegates, Juan Pastorin y Vacher, put it, urged that all attempts to settle the issue upon an exclusively geographical basis (to say nothing of a national basis) be set aside, and that the matter be decided on astronomical, scientific, and neutral grounds. Janssen decried the necessity for 'any material mark on the globe' although he conceded that 'if one be desired, though it is in no manner necessary,' it could be established in conformity to a neutral meridian fixed in its relationship to other points by the measurements of the various national observatories.[19]

Janssen failed to divert the growing consensus to select Greenwich as the world's prime meridian. The Washington Conference, with France and Brazil abstaining, voted to declare Greenwich the site of the prime meridian. At the same time, it also determined that longitude should be counted in two directions up to 180°, east longitude being plus and west longitude minus, a decision which reversed the recommendation of the Rome conference to count longitude in one direction from west to east. The Conference also proposed the adoption of a universal day 'for all purposes for which it may be found convenient, and which shall not interfere with the use of local or other standard time where desirable.' The universal day was defined as 'a mean solar day' and 'to begin for all the world at the moment of mean midnight of the initial meridian, coinciding with the beginning of the civil day and date of that meridian, and is to be counted from zero up to twenty-four hours.'[20]

19. Juan Pastorin y Vacher, *Memoria sobre el Congresso Internacional de Washington* (Madrid: Imprenta de Fortanet, 1885), p. 28. *International Conference held at Washington*, p. 30.

20. Howse, *Greenwich Time*, pp. 38-151.

This paper was originally given at the V. Coloquio de Historia Canario-Americana, Las Palmas de Gran Canaria, October 4-12, 1982 and will also appear in the Proceedings of this Conference.

Dr. Washburn attended Phillips Exeter Academy, Dartmouth College and Harvard University, where he received his Ph.D. in the History of American Civilization in 1955 *after writing a dissertation under Samuel Eliot Morison. He has written extensively in the field of early American history, exploration and discovery and Indian-white relations. He is presently Director of the Office of American Studies, Smithsonian Institution, and Vice President of the International Commission for Maritime History.*

The Antebellum Maine Fishing Schooner and the Factors Influencing Its Design and Construction

By Wayne M. O'Leary

MORE than a half-century ago, the noted marine writer and historian Lincoln Colcord observed that '. . . the majority of large fishing schooners along the Maine coast have from the earliest times been built in Essex and other Massachusetts towns.'[1] Those words have never been challenged and the result has been the disappearance of an entire class of vessels—indigenous to its region and in many respects unique—from the annals of American maritime history.

Given the fragmentary nature of the historical evidence available, Colcord's superficial impression about Maine schooner building is not surprising and in fact he was partially right. The relatively complete records of the post–Civil War period suggest that most Maine fishermen did, indeed, obtain their vessels outside the state at that time. Well over half of the Castine District fishing fleet of the late 1870's, for example, was comprised of schooners built not in Maine but in Massachusetts—primarily Essex.[2] During the 1850's, however, the exact reverse was true, as an extended application of Lincoln Colcord's own research makes clear.

Using Colcord's compilation of nineteenth century vessels built on Penobscot Bay in conjunction with fishing returns provided by newspaper marine lists of the period, it is possible to identify at least 72 (or 59 percent) of the 123 Grand Banks schooners fishing out of Penobscot Bay ports between 1850 and 1859 as having been built locally, within the confines of the bay itself.[3] This number does not include some vessels which were undoubtedly constructed in Maine yards outside the immediate Penobscot region, nor does it include the many regional vessels whose documentation disappeared prior to being examined in the 1930's. Colcord's list, published in 1932, was compiled from what then remained of the original ship registers and enrollments for the Penobscot Bay ports, which were stored in regional customshouses serving the districts of Belfast, Bangor and Castine (ex-Penobscot). By his own estimate, approximately half of the relevant documents had been lost or destroyed by that date.[4]

Generalizations arising from an overall study of the Colcord building records may be buttressed by examining two individual Penobscot ports for which relatively complete data are fortunately available for the early period. Out of thirty-two vessels in the Belfast fishing fleet of 1852 with documented building sites, nineteen (59 percent) were launched in Maine, eleven of them from local Belfast yards. Only eight came down the ways at Essex.[5] Similarly, an analysis of the Bucksport Grand Banks fleet of 1859 indicates that two-thirds of that town's eighteen bankers were the handiwork of local shipwrights.[6]

It is readily apparent, based on this evidence, that prior to 1860 the Maine deep-sea fisheries were responsible for the creation of a native-built schooner class of considerable proportions. Why then did the flawed notion take hold that few of the state's vessels were produced locally? Perhaps the major reason lies in the uses to which those vessels were put.

Unlike its more specialized Massachusetts counter-

1. L. Colcord (comp.), 'Record of Vessels Built on Penobscot River and Bay' in *Sailing Days on the Penobscot*, by G. S. Wasson (Salem, Mass.: Marine Research Society, 1932), p. 424.

2. Penobscot Marine Museum, General Collection, MS. 78: Castine Customs Collector's Abstract of Licenses for the Fisheries, 1870-1889, passim. [This collection hereafter cited as PMM, GC.]; *Record of American and Foreign Shipping, 1879, 1882* (New York: American Shipmasters' Association, 1879 and 1882), passim; *Merchant Vessels of the United States, 1884* (Washington: Government Printing Office, 1884), passim.

3. *Eastern Argus* (Portland, Maine), marine lists, 1853-1859, passim; *Republican Journal* (Belfast, Maine), marine lists, 1850-1854, 1859, passim; *Ellsworth* (Maine) *Herald*, marine lists, 1851-1854, passim; *Ellsworth* (Maine) *American*, marine lists, 1855-1859, passim; Colcord, passim. These and all other vessels mentioned in this study were—except where otherwise identified—two-masted schooners.

4. Colcord, pp. 217-18.

5. *Republican Journal*, 6 August 1852, p. 1; National Archives, Records of the Bureau of Marine Inspection and Navigation (Record Group 41), Belfast District Enrollments, Vol. 8: Certificates of enrollment, various vessels, 1848-1852.

6. Fogler Library of the University of Maine at Orono, Special Collections, MS: 'Vessel Property Owned in Bucksport [Maine], 1859,' passim; *Eastern Argus*, marine lists, 1853-1863, passim; *Republican Journal*, marine lists, 1850-1854, 1859, passim; Colcord, pp. 290-308, 347-52, passim.

part, the typical Maine fishing schooner was used in multiple employments. It was not just a fishing vessel and its identity as such was therefore blurred. Economic necessity—in particular the relative poverty of the owners themselves and the marginal nature of their businesses—dictated that Maine schooners should be compromise craft, able to perform as merchant coasters in the off-season as well as fish.

Multiple employment of vessels was always a feature of Maine's subsistence-oriented maritime economy. Moses Greenleaf, one of the state's early chroniclers, took note in 1829 of the tendency to use Down East fishing schooners in more than one occupation, and Lorenzo Sabine observed the same practice more than twenty years later, while studying the region's fisheries for the Department of the Treasury.[7] The Maine cod banker or mackerel catcher was of necessity a year-round vessel. In 1841, the customs collector for Portland-Falmouth reported that the larger fishing schooners of his district were rarely laid up at the end of a season. Instead, they were employed to carry their cured catch as far south as Chesapeake Bay and environs, returning home with cargoes of agricultural produce.[8]

The larger class of Maine fisherman was in fact used to transport a wide variety of items unrelated to the fisheries. This was especially true of the cod bankers of eastern Maine's Penobscot region. Schooner *Glendower* (112 tons, o.m.) of Castine, for instance, prefaced a trip to the Grand Banks in the spring of 1854 with a winter coasting voyage to New York, carrying a load of plaster south from Eastport and returning to Penobscot Bay with flour, salt, corn and other foodstuffs.[9] Another Castine schooner, *Sarah D. Sparks* (113 tons, o.m.), worked the Grand Banks during her second season of operation in 1853 and was reported coasting with lumber, lime, bricks and molasses the following year.[10]

Unsurprisingly, given the proximity of Maine's vast woodlands, lumber and finished forest products were common cargoes for Penobscot Bay fishing schooners. These ran the full gamut in bulk and variety. *Uranus* (96 tons, o.m.), a Bucksport banker, went ashore on Nantucket in late October 1845 while running spars to Baltimore, but survived to spend several summers catching codfish off Newfoundland.[11] *Redwing* of Castine (113 tons, o.m.) filled the time between two Grand Banks voyages in 1853-1854 transporting planks, shingles, clapboards and house frames from Bangor to Boston in exchange for hardware and dry goods.[12] Another member of the Castine fleet, *Albion* (107 tons, o.m.), spent the better part of one winter carrying box shooks from Frankfort on the Penobscot River to Havana, Cuba, prior to her spring departure for the cod grounds.[13]

The West Indies was a not-untypical destination for the larger class of eastern Maine fishing schooners in the years before 1860. Ports of call like Matanzas, Havana, Cardenas, Aux Cayes and Port au Prince appear repeatedly in newspaper accounts of their winter activities. Indeed, no fewer than six documented Penobscot Bay cod bankers were lost on voyages to the Caribbean.[14] Vessels engaging in the dangerous off-season Indies trade rarely came through unscathed. The experiences of two Penobscot Bay schooners in the winter of 1853 were representative of the conditions faced. *Nancy L. Wasson* (103 tons, o.m.) of Brooksville split her sails and lost a deckload of molasses during a stormy passage from Cuba to New York in March of that year, while *Silver Cloud* (103 tons, o.m.) of Brooklin, bound from Haiti to New York with logwood, had part of that cargo and a portion of her rigging swept away in the same gale. Nevertheless,

7. M. Greenleaf, *A Survey of the State of Maine* (Portland, Me.: Shirley & Hyde, 1829), p. 253; U.S., Department of the Treasury, *Report on the Principal Fisheries of the American Seas,* by L. Sabine, 32nd Cong., 2nd Sess., 1853, Sen. Exec. Doc. 22, p. 182.

8. U.S., Congress, Senate, Committee on Finance, *Document in Relation to the Bounties Allowed to Vessels in the Fisheries,* by J. Anderson, 26th Cong., 2nd Sess., 1841, Sen. Doc. 148, p. 1.

9. *Eastern Argus,* marine list, 26 September 1854, p. 2; Penobscot Marine Museum, The Witherle Papers, Miscellaneous Vessels, box 1, file 26: schooner *Glendower,* settlement of trips from Eastport to New York and from New York to Belfast and Frankfort, 7 January 1854. [This collection hereafter cited as PMM, WP.]

10. *Republican Journal,* marine list, 7 October 1853, p. 3; *Eastern Argus,* marine lists, 25 April 1854, p. 2, and 10 July 1860, p. 2; National Archives, Records of the Bureau of Customs (Record Group 36), Penobscot District Foreign Manifests, box 2: Outward manifest of schooner *Sarah D. Sparks,* Castine for St. Peter's, Martinique, 16 August 1854.

11. *Republican Journal,* marine list, 31 October 1854, p. 3; *Eastern Argus,* marine lists, 24 September 1853, p. 2, 26 September 1854, p. 2, and 4 October 1855, p. 2.

12. *Republican Journal,* marine list, 7 October 1853, p. 3; *Eastern Argus,* marine list, 26 September 1854, p. 2; PMM, WP, Miscellaneous Vessels, box 2, file 1: schooner *Redwing,* settlement of trip from Bangor to Boston, 16 December 1853; National Archives (RG 36), Penobscot District Coastwise Manifests, box 4: Inward manifest of schooner *Redwing,* Castine from Boston, 7 April 1854.

13. *Republican Journal,* marine list, 3 March 1848, p. 3; National Archives, Records of the Department of the Treasury (Record Group 56), Vol. 417: Penobscot District Customs Collector's Abstract of Bounty Allowances Paid to Vessels Employed in the Bank and Other Cod Fisheries, 1st Quarter 1849.

14. Schooners *Samuel Noyes* (1845), *Martha Burgess* (1856), *Rattlesnake* (1857), *Mayflower* (n.d.), *City Belle* (1860) and *H. Louis Orcutt* (1863). See: Colcord, pp. 268, 298-99, 316-17; *Republican Journal,* marine list, 5 September 1845, p. 3; *Eastern Argus,* marine lists, 24, 30 September 1853, p. 2, 22 September 1854, p. 2, 11 April 1856, p. 2, 28 September 1857, p. 2, 6 March and 21 September 1860, p. 2, and 4 July 1863, p. 3; PMM, GC, MS. 6: Log of the schooner *Martha Burgess,* 29 May and 27 July 1853.

Table I

Design Characteristics of Selected Classes of North American Fishing Schooners

Building Site or Locale	*Period*	*Average Register Dimensions*	*Average Tonnage (N.M.)*	*Average Tonnage (O.M.)*	*Average Beam-Length Ratio*	*Average Depth-Beam Ratio*	*Depth-Beam Ratios Above 1: 2.75*	*Depth-Beam Ratios Below 1: 2.75*	*Size of Vessel Sample*
Penobscot region of Maine*	1850-1859	73′ x 20′ x 8′	69	103	1: 3.65	1: 2.50	13 (28%)	34 (72%)	47
Cape Ann region of Massachusetts**	1850-1859	67′ x 20′ x 7′	54	81	1: 3.35	1: 2.86	40 (47%)	46 (53%)	86
Lunenburg, Nova Scotia†	1880-1889	76′ x 23′ x 9′	88	136	1: 3.30	1: 2.56	7 (11%)	55 (89%)	62
Essex, Massachusetts‡	1880-1889	82′ x 23′ x 8′	89	132	1: 3.57	1: 3.57	31 (55%)	25 (45%)	56

* Sources: L. Colcord (comp.), 'Record of Vessels Built on Penobscot River and Bay' in *Sailing Days on the Penobscot,* by G. S. Wasson (Salem, Mass.: Marine Research Society, 1932), passim; *Eastern Argus* (Portland, Maine), marine lists, 1853-1859, passim; *Republican Journal* (Belfast, Maine), marine lists, 1850-1854, 1859, passim.

** Sources: *Record of American and Foreign Shipping, 1882* (New York: American Shipmasters' Association, 1882), passim; G. B. Goode et al., *Materials for a History of the Mackerel Fishery* (Washington: Government Printing Office, 1883), pp. 420-29, passim.

† Sources: *Lunenburg* (Nova Scotia) *Progress,* 24 October 1888, p. 2; M. B. DesBrisay, *History of the County of Lunenburg* (3rd ed.; Bridgewater, N.S.: The Bridgewater Bulletin, Ltd., 1867), p. 466; Canada, Department of Marine and Fisheries, *List of Vessels on the Registry Book of the Dominion, 1886, 1895* (Ottawa: private printers, 1887 and 1896), passim.

‡ Sources: *Record of American and Foreign Shipping, 1882,* passim; *Record of American and Foreign Shipping, 1891* (New York: American Shipmasters' Association, 1891), passim.

both vessels were on the Grand Banks a few weeks later handlining for cod.[15]

The use of Maine fishing schooners in more than one occupation had a pervasive influence on their design. While obscuring the vessels' primary role as fishing craft, the necessity of performing as coasters made them rather distinctive as a type. The natural hazards and commercial demands imposed by the carrying trade placed a premium on strength, seaworthiness and cargo capacity. The prevailing mania for speed infecting the American fisheries throughout the 1840's and 1850's was, therefore, much less pronounced Down East than elsewhere in New England.

The upshot was a classic demonstration of the influence of economics on naval architecture. Needing a type of vessel serviceable for multiple employment, Maine builders produced a versatile, compromise craft characterized by moderation in all respects save size and totally lacking in extreme features of design. This all-purpose schooner, exceeding 100 tons (o.m.) as a rule, was a large vessel for its time and rig and among the largest two-masters to visit the fishing grounds of the North Atlantic during the nineteenth century.[16] A burdensome yet practical class, which Howard I. Chapelle dubbed the 'fisherman-coaster,'[17] it constitutes Maine's most visible contribution to the art and science of naval architecture as applied to the fisheries.

Although widely built throughout the state (there is evidence of the type as far west as Portland and as far east as Harrington in Washington County[18]) the multi-purpose fisherman-coaster was most fully represented by the cod bankers of the Penobscot Bay region. It was here that a third of all Maine schooner building took place during the boom decade of the 1850's, and nowhere else in the antebellum period were the interests of deep-sea fishing and the coastal trade combined to a greater extent. On the eve of the Civil War, the Penobscot region owned 24 percent of New England's entire cod-fishing tonnage and 14 percent of its total coasting tonnage. These figures also represented nearly half of Maine's own fishing vessels and over a quarter of the state's coasters.[19]

There is no question that the fishing schooners built in this part of eastern Maine were specifically designed for more than just fishing. A report on the launch of a 125-ton two-master, *Golden Cloud,* at North Haven in 1853 noted, 'She is intended for the Bank fishery in the summer, and the West Indies trade in winter.'[20] The careers of numerous other regional fishing schooners indicate that this vessel was not at all atypical. Several Penobscot Bay vessels from the ports of Belfast, Bucksport and Castine went winter coasting in their very first years of operation, immediately following the fishing season, which (in contrast to the commonplace use of aged ex-fishing schooners for summer freighting) suggests a unique and consciously planned dual role.[21]

The design requirements imposed on Maine's antebellum fishing fleet by the bulk-carrying trades, which called for substantial storage capacity and above-average seakeeping qualities, were reinforced by the uses to which that fleet was put on the fishing grounds. Unlike Massachusetts, its major rival in the fisheries, Maine was primarily a cod-fishing state. It largely neglected the mackerel fishery, and came late to fresh-market fishing. This was a function of economics and geography. Maine merchants lacked the capital to engage in the more profitable but also more expensive and uncertain mackerel fishery. They also lacked rail access to the nation's population centers, a prerequisite for pursuit of the fresh-market fisheries.[22]

The Bay State, whose fish merchants suffered no such limitations, was much more concerned with both mackereling and fresh marketing, preoccupations that led to the development of the so-called 'sharpshooter' and 'clipper' schooners in the late 1840's and early 1850's. These marked departures in search of speed under sail were prompted in part by the need for swift, nimble vessels able to pursue migrating schools of mackerel, and in

15. *Ellsworth Herald,* marine lists, 4, 11 March 1853, p. 3; *Eastern Argus,* marine list, 30 September 1853, p. 2; Log of *Martha Burgess,* 28 July and 12 August 1853.

16. For a representative list of vessels, including dimensions and tonnages, see W. M. O'Leary, 'The Maine Sea Fisheries, 1830-1890: The Rise and Fall of a Native Industry' (Ph.D. dissertation, University of Maine at Orono, 1981), pp. 617-18.

17. H. I. Chapelle, *The National Watercraft Collection* (Washington: Government Printing Office, 1960), p. 200.

18. *Eastern Argus,* marine lists, 18 November 1859, p. 2, and 16 August 1860, p. 2.

19. U.S., Department of the Treasury, *Report on the Foreign Commerce and Navigation of the United States* (annual), 1850-1859, statements on tonnage and shipbuilding. See also: U.S., Department of the Treasury, *Report on the Foreign Commerce and Navigation of the United States, 1860* (Washington: George W. Bowman, 1860), pp. 650-51.

20. *Eastern Argus,* marine list, 28 November 1853, p. 2.

21. For example, schooners *Uranus* of Bucksport (1845), *Mazurka* and *Olivia* of Belfast (1852) and *Eothen* of Castine (1860). See: *Republican Journal,* 1 August 1852, p. 1; Ibid., marine lists, 29 August and 31 October 1845, p. 3, 2 April and 26 November 1852, p. 3; *Eastern Argus,* marine lists, 27 April and 30 July 1860, p. 2; Colcord, p. 295; PMM, WP, Miscellaneous Vessels, box 1, file 8: schooner *Eothen,* invoice of merchandise, Castine to Norfolk, 31 October 1860, and settlement of banks voyage, 17 April 1861.

22. O'Leary, pp. 37-45, 419-41.

part by the requirement of bringing fresh iced fish quickly to market before spoilation.[23]

The salt cod fishery, pursued at leisure and at anchor, made no such demands. It simply required a vessel of sufficient size to make the long stay on the banks physically tolerable and economically worthwhile. In the words of Howard Chapelle:

> The necessity of speed was greater in the case of the market boats than in that of the bankers, ... The bankers, because they stayed out on the banks until they had a full cargo of fish, or 'fare' salted down, were more of the carrier type than were the market boats which made rapid trips to the inshore banks and brought home fresh fish in wet wells or iced.[24]

The salt bankers predominating in the Maine fleet were therefore heavier and more full-bodied than the market schooners typical of Massachusetts ports. Sufficient capacity, as Chapelle noted, was the prime requirement of this class while slow sailing was, if not desirable, at least not a serious handicap.[25]

The size differential between these two vessel types is evident in a comparison of the respective fishing fleets of Penobscot and Gloucester districts for the years 1847-1848. Both fleets were similar numerically and in average per-vessel tonnage. However, Penobscot District, the center of cod banking in Maine, contained three times as many schooners exceeding seventy tons as did Gloucester, most of whose vessels were medium-sized schooners (fifty to seventy tons) of the sort commonly used in the mackerel and market fisheries.[26]

Differences in vessel size between the 'capital ships' of the Maine and Massachusetts fishing fleets carried over into the next decade. Sample data for schooners built between the years 1850 and 1859 in the Penobscot region of Maine and the Cape Ann region of Massachusetts reveals a substantial difference in average tonnage and a correspondingly striking contrast in vessel dimensions. Maine schooners were roughly one-quarter larger overall than their Bay State counterparts, and also proportionately longer, narrower and deeper. To use fishermen's parlance, the Down East schooners were 'long-legged' vessels, measuring a foot more in average depth-of-hold than the schooners built in Massachusetts (Table I). This aspect of their design was to some extent a function of size, since they measured some twenty to twenty-five tons more than Essex-built craft of the period. It was also a reflection of the requisites of their dual trades, which deemphasized speed in favor of seaworthiness. To an equal degree, however, it was an outgrowth of the third major factor influencing the design of Maine fishing schooners—environment.

It was possible, although technically unsound, to achieve substantial additional tonnage and capacity without adding great depth to a sailing vessel. This was done at Cape Ann to meet prevailing natural conditions. Howard I. Chapelle convincingly argued that the trend toward longer and wider, but not deeper, vessels in the Massachusetts fisheries after 1845 was extensively influenced by the shallowness of Gloucester Harbor, which could not handle deep-draft vessels. The problem of shoal water at this major port was particularly acute with respect to berthing slips and their approaches, and unsuccessful attempts to obtain federal funds for dredging and deepening were made throughout the 1850's. As a result of the failure to institute harbor improvements, increases in vessel dimensions came to be limited almost solely to length and breadth, leading to a fleet of inherently unstable fishermen characterized by extreme shallowness, the hallmark of the famous—or infamous—'clipper' schooner developed by Massachusetts builders in the 1850's.[27]

Cape Cod shared in the problem of Gloucester to a degree accentuated by that region's unique marine environment. Harbors on the Cape were subject to constantly shifting sands that not only dictated vessel design—for example, the development of the shoal-draft Cape Cod Catboat—but occasionally threatened economic survival. The port of Dennis, once a thriving fishing village able to accommodate dozens of vessels, filled with sand around 1860, and fishing operations were effectively terminated there. A similar natural phenomenon was visited upon the Cape town of Chatham shortly after 1845, with the result that this erstwhile cod-fishing port was forced to exchange its large bankers for a smaller class of mackerel schooners still able to negotiate local waters.[28] Northern Massachusetts ports were also plagued by shoal conditions. Newburyport, the Bay

23. Ibid., pp. 46-47; see also H. I. Chapelle, *American Sailing Craft* (New York: Kennedy Brothers, 1936), p. 70, and Chapelle, *The National Watercraft Collection*, p. 166.

24. Chapelle, *American Sailing Craft*, p. 66.

25. H. I. Chapelle, *The American Fishing Schooners, 1825-1935* (New York: W. W. Norton & Co., 1973), p. 64.

26. National Archives (RG 56), Penobscot District Abstract of Bounty Allowances, 1st Quarter 1849, passim; G. B. Goode (ed.), *The Fisheries and Fishery Industries of the United States* (7 vols.; Washington: Government Printing Office, 1887), Sec. II, p. 692.

27. Chapelle, *The American Fishing Schooners*, pp. 107, 135; see also Chapelle, *American Sailing Craft*, p. 72, and H. Hall, *Report on the Shipbuilding Industry of the United States* (Washington: Government Printing Office, 1882), p. 17.

28. Goode, Sec. II, pp. 729-30.

State's major fisheries center north of Cape Ann, was a shallow river port whose tricky approaches were complicated by a shifting sandbar across the mouth of the Merrimac River.[29]

No comparable geophysical difficulties were encountered Down East. Beyond Portland, the flat, marshy, sandy shoreline typical of southern New England gradually evolved into the deep, jagged and rockbound shore more typically associated with Maine.[30] In 1880, a government report described the state's coastline in the following manner:

> The principal furrows and ridges extend nearly north and south, the shoreline being made up of a series of rocky peninsulas and fjords, which give to Maine a peculiarly rugged and uneven coast with hundreds of excellent harbors, in many of which the largest vessels of the world can find safe anchorage.[31]

Among eastern building centers, the premier Grand Banks ports of Castine and Bucksport were especially favored by nature. Both had excellent deep-water harbors. Of Castine, Edmund Blunt wrote in *The American Coast Pilot,* 'You may anchor off the town, near the wharves, in from 8 to 10 fathoms water.'[32] Bucksport, though plagued by eddies and tidal swirls caused by the proximity of the Penobscot River entrance, provided up to fourteen fathoms of water for berthing vessels.[33]

Such accommodating environmental conditions influenced the design, as well as the use, of fishing schooners, or more precisely, did not influence them to the same degree as natural conditions found elsewhere, which amounted to the same thing. Unlike the schooner builders at Essex, whose yards were located several miles from the sea, on a narrow river navigable only at high tide,[34] the Maine builders at places like Castine and Bucksport suffered from no restrictions on their work other than those imposed by economics. From a purely physical standpoint, whatever the buyer desired or the trade demanded could be readily delivered.

Environmental factors, then, reinforced economic factors in determining the course of vessel design in the New England fisheries. Massachusetts fishermen, already predisposed to the mackerel and fresh fisheries, had at some places almost no recourse but to order a vessel best adapted to those occupations. Maine fishermen, on the other hand, were encouraged to have built the type of craft most suited to the salt cod fishery. This is not to say that no large, deep-draft vessels were built in the Bay State, and no small, shoal-draft schooners produced Down East. That would be a misstatement. It is obvious, however, that a subtle interweaving of economic and environmental influences produced a measurable difference in naval architecture, as applied to the fishing vessels of northern and southern New England.

In some respects, eastern Maine resembled Atlantic Canada in the style of vessel it preferred. Both of these cod-fishing regions favored heavy-displacement, deep-draft schooners. The Penobscot Bay vessels of the 1850's were strikingly similar to the Lunenburg, Nova Scotia bankers of the 1880's in terms of low depth-to-beam ratios. On the other hand, the pre–Civil War Maine cod bankers exhibited a much higher beam-to-length ratio than the Lunenburgers, and in this respect conformed more to the postwar Massachusetts practice than to that of the Canadian builders, whose vessels tended to be quite short in relation to maximum breadth (Table I). Indigenous Maine fishing schooner design, as exemplified by the multipurpose Penobscot fleet, was essentially a compromise between the extremes in naval architecture evidenced in the fisheries of Nova Scotia (short, deep vessels) and Massachusetts (long, shallow vessels), extremes produced by variant industry specialization and contrasting marine environments. Within the context of the North American fishing community the Maine schooner was, architecturally-speaking, a hybrid type.

The economic and environmental factors that shaped the development of the hybrid Maine schooner in terms of size and general configuration had one other effect. They reinforced a broad regional tendency toward technological conservatism which in turn influenced certain aspects of vessel performance. In the fisheries, Maine's technological 'backwardness' was reflected most particularly in its reluctance to join in the nineteenth century's avid search for speed under sail.

To some degree, this posture was a product of geographic isolation. Most refinements in schooner design and other aspects of fisheries technology moved in a west-to-east direction along the northern New England coast, germinating in the urban environs of Greater Boston and spreading gradually to the distant regional out-

29. G. W. Blunt (ed.), *The American Coast Pilot* (16th ed.; New York: E. & G. W. Blunt, 1850), p. 159.

30. J. Hay and P. Farb, *The Atlantic Shore: Human and Natural History from Long Island to Labrador* (New York: Harper & Row, 1966), p. 35.

31. Goode, Sec. II, pp. 7-8.

32. Blunt, p. 143.

33. G. S. Wasson, *Sailing Days on the Penobscot* (Salem, Mass.: Marine Research Society, 1932), pp. 6, 15.

34. Goode, Sec. II, p. 140; Chapelle, *The American Fishing Schooners,* p. 76.

ports.[35] Down East Maine was firmly positioned at the end of this technological pipeline.

To the inhibiting influence of Maine's coastal geography were added certain economic constraints. Not only were the state's fishery entrepreneurs (and, in turn, its schooner builders) limited in the type of vessel they could produce by the necessity of combining cod banking with the coasting trade, they were also discouraged from radical experimentation by the marginal nature of their maritime economy in general. New departures in vessel design were, quite simply, too expensive and potentially risky for most Maine fish merchants. This fact of life was responsible in no small measure for the state's technological lag in producing fast-sailing fishing vessels, a phenomenon abundantly in evidence throughout the pre–Civil War decades.[36]

The 'sharpshooter' model, developed for speed by Cape Ann schooner builders, is a case in point. The prototype for this class, the famous *Romp,* was built at Essex in the winter of 1846-1847. She was followed by several others of similar design in 1848-1850, and within four years the type was well known all along the New England coast.[37] Nevertheless, the first sharpshooter did not appear in Maine waters until 1851, when *Astoria* (tonnage unknown) was built at Essex for Captain Benjamin Maddocks of Southport, a fishing village in the Boothbay region. Wrote a local historian of the cautious reaction to the new schooner, "'It proved a good sailor and seaworthy vessel, but at first many dire prophecies were made regarding her.'"[38] Presumably, some native versions of *Astoria* must have followed once the vessel's credentials were established, but no record exists of the first sharpshooter launched Down East.

Maine was equally reluctant to accept the next trend in fast schooner design, the so-called 'clipper,' which developed concurrently with the sharpshooter but reached its peak in popularity a few years later. The clipper hull was another innovation of the Essex builders, who experimented with it as early as 1848.[39] The model was readily copied by other Massachusetts builders, as evidenced by the construction of two clippers the following year at East Boston on behalf of Wellfleet fishing interests.[40] At least two more years passed before the type appeared in Maine, the first known example being *C. G. Matthews* (80 tons, o.m.), launched at Boothbay in April of 1851 by Stephen Sargent, Jr. This schooner was followed within two months by Portland-built mackerel clipper *Dolphin* (97 tons, o.m.). Together these two vessels mark the practical start of speed-oriented schooner construction Down East.[41]

Eastern Maine gingerly tried the new fashion in 1852, beginning with the launch of clipper mackerel schooner *Vesta* (99 tons, o.m.) from the Belfast yard of S. P. Carter & Company.[42] However, judging from the register dimensions of forty-seven randomly selected fishing vessels built on Penobscot Bay, full acceptance of the model was delayed in the eastern region until well after 1860. Instead of the 1 to 3.00 depth-to-beam ratio that distinguished the typical shoal-draft clipper,[43] most of the schooners built in and around Penobscot Bay during the 1850's had closer to a 1 to 2.50 ratio, indicative of a much more conservative hull design. Only about a quarter of the available sample of large fishermen launched in the region between 1850 and 1859 conformed dimensionally to the clipper model, and even among those built after it was fully introduced there (circa 1852-1853), two thirds continued to adhere to the traditional deeper-draft building mode.[44] In contrast, an examination of eighty-six Cape Ann-built Massachusetts vessels from the 1850-1859 period reveals that approximately one half had clipper characteristics, i.e., depth-to-beam ratios higher than 1 to 2.75 (Table I).

The failure of Maine schooner builders to follow the latest developments or fads in vessel design produced both positive and negative results. On the plus side, the archetypical Down East schooner was an eminently sensible craft in terms of general seaworthiness. Maine's conservative vessels of the antebellum period had none of the dangerous properties associated with the clipper-designed mackerel schooners of the 1870's, some of which were built so shallow and sharp for fast sailing that they could go neither winter fishing nor long-distance coasting, for fear that they would not survive off-season gales on the open ocean.[45]

35. O'Leary, pp. 256-57.

36. Ibid., pp. 44-49.

37. Chapelle, *The American Fishing Schooners,* pp. 65-73; ———, *American Sailing Craft,* p. 63; ———, *The National Watercraft Collection,* p. 168.

38. F. B. Greene, *History of Boothbay, Southport and Boothbay Harbor, Maine* (Portland, Me.: Loring, Short & Harmon, 1906), p. 368.

39. Chapelle, *The American Fishing Schooners,* pp. 68-70, 74-75.

40. S. E. Morison, *The Maritime History of Massachusetts, 1783-1860* (Boston: Houghton Mifflin Co., 1921), p. 306.

41. *Eastern Argus,* marine lists, 26 April, 13 June and 20 December 1851, p. 2.

42. *Republican Journal,* marine list, 4 June 1852, p. 3.

43. Chapelle, *The American Fishing Schooners,* pp. 76-118, passim; ———, *The National Watercraft Collection,* pp. 195-219, passim.

44. O'Leary, pp. 617-18.

45. Goode, Sec. V, Vol. I, 248.

On the other hand, the pre–Civil War Maine schooner was an admittedly ponderous vessel under sail. Surviving logbooks of the 1840's and 1850's provide a glimpse at the speed capabilities of several representative Grand Banks schooners hailing from the Penobscot region. One was *Martha Burgess* (118 tons, o.m.) of Castine, a fisherman-coaster later lost on a winter voyage to Martinique.[46] Returning from her maiden trip to the Newfoundland fishing grounds in October 1853, this new schooner logged 1,026 miles in seventeen days, a lackluster 60 miles per day or 2.5 knots average speed. Isolating the two best days of the entire passage provides a somewhat more detailed gauge of the vessel's ability. On 1 October, in what skipper J. W. Sylvester called a '. . . fresh breeze easterly which increased to a smart blow,' the westbound schooner covered 132 nautical miles, averaging 5.5 knots. A few days later, on 10 October, *Burgess* made 115 miles, an average of 5 knots for the 24-hour period. The entry in the log for that day included the revealing comment, 'Fine weather, good run.'[47]

Black Hawk (tonnage unknown), a Bucksport banker whose logbook has survived, visited the Newfoundland grounds in 1847. Her sailing record is somewhat better, though hardly outstanding by later standards. Outward bound in late May, this schooner averaged 3.6 knots for eleven days and logged a single day's best of 161 miles, or 6.7 knots over twenty-four hours. Bound home against the prevailing westerlies in late August, *Black Hawk* averaged barely 2.8 knots for thirteen days, reaching a peak of just 6.4 knots for one twenty-four-hour period. The top speed recorded was 8 knots, maintained for six hours on 30 May, while on a reach, in what the captain described as 'fresh gales.' That level was attained only twice more over the entire twelve months covered by the schooner's log, once on the homeward passage from the banks and again while on a coasting trip to Baltimore.[48]

The best verifiable performance by a pre–Civil War Maine fisherman-coaster, based on logbook entries, was the 9 knots reached for four hours on 13 January 1856 by another Bucksport banker, *H. Louis Orcutt* (113 tons, o.m.), while coasting to Pensacola, Florida. This mark was set running off the wind in a fresh breeze with intermittent squalls. In similar conditions two weeks later (26 January), *Orcutt* made 171 nautical miles over a twenty-four-hour period, averaging better than 7 knots and logging 8 knots for a considerable period. Most of this work was done under four lowers and a reefed mainsail with the wind abeam or on the quarter, the vessel's fastest point of sailing.[49]

Compared to the records set by numerous fishermen in the 1870's, the performances of these antebellum Maine bankers were unimpressive. Gloucester schooner *Victor* (71 tons, n.m.) was said to have reached a speed of 11 knots or more on several occasions in 1879, and another Gloucesterman logged 13 knots for seven consecutive hours on a run home from Canso in the fall of 1877, an achievement that contemporary authority Joseph W. Collins maintained was not at all unusual among Cape Ann schooners of the time.[50] Writing in 1880, Collins claimed a maximum capability of 10 to 12 knots for most of the vessels then in the American fishing fleet, with 14 knots not beyond the realm of possibility for the biggest and best of them.[51] Such speeds were unheard of in the eastern Maine fleet of the 1850's. The typical Down East cod-fishing schooner of the early period needed two full weeks to return from the Grand Banks, a passage that Gloucester's halibut catchers were able to make in a week or less during the late 1870's.[52]

It is perhaps unfair to measure the Penobscot Bay salt bankers of the pre–Civil War years against the more technologically advanced fishing schooners of a later era. More useful to the purpose of this study would be a comparison of the schooners of eastern Maine with their contemporaries in the Massachusetts fishing fleet. Fortunately, descriptive data on hull shapes contained in *American Lloyd's Registry of American and Foreign Shipping* permits just such a comparison to be made. Lloyd's examiners recorded not only tonnages and dimensions, but also whether the vessels they surveyed were 'sharp,' 'medium' or 'full' in general appearance. These subjective judgments, though unscientific, delineate clear differences in the mid-nineteenth-century fishing

46. *Eastern Argus,* marine lists, 11, 15 April 1856, p. 2.

47. Log of *Martha Burgess,* 1-17 October 1853.

48. PMM, GC, MS. 21: Log of the schooner *Black Hawk,* 23 February, 21-31 May and 15-27 August 1847.

49. Ibid., MS. 353: Log of the schooner *H. Louis Orcutt,* 13, 26 January 1856.

50. Goode, Sec. V. Vol. I, 172.

51. Ibid., Sec. IV, p. 139.

52. See voyages of schooners *Black Hawk* (1847), *Mentora* (1852), *Martha Burgess* (1853), *Lone Star, Smilax* and *Northern Eagle* (1855), *Diana* (1857) and *Amazon* (1859): Log of *Black Hawk,* 15-27 August 1847; Log of *Martha Burgess,* 1-17 October 1853; PMM, GC, MS. 354: Log of the schooner *Mentora,* 13-26 August 1852; *Eastern Argus,* marine lists, 18, 21 August 1855, p. 2, 10, 19 September 1857, p. 2, and 20, 26 August 1859; see also W. G. Pierce, *Goin' Fishin': The Story of the Deep-Sea Fishermen of New England* (Salem, Mass.: Marine Research Society, 1934), pp. 137-38, and Goode, Sec. V, Vol. I, 71-73, 86-89.

vessel architecture of northern and southern New England that went beyond mere disparities in register measurements. Using Lloyd's 1863 and 1874 editions, it is possible to isolate fifty-seven Cape Ann and forty Penobscot Bay schooners built between 1850 and 1860. Of the Bay State vessels, thirty-five (or 61 percent) were judged to have either sharp or medium models. The Maine sample, on the other hand, included almost no vessels in those two categories. Instead, thirty-four out of forty (or 85 percent) were listed as full-built.[53]

Despite an obvious lack of speed potential, the workmanlike fisherman-coasters of the Down East region were admirably suited to the peculiar requirements of their dual trades. Throughout the two decades leading up to the Civil War, they were built in great numbers all along the shores of eastern Maine. Within a few short years following the outbreak of North-South hostilities, however, they had virtually disappeared as an identifiable type.

The most obvious answer to the disappearance is that an overall industry decline in the postwar period allowed few new fishing schooners to be built in eastern Maine shipyards to replace the existing fleet of vessels as they aged. The formerly prolific Penobscot District yards, which turned out a total of 123 schooner-rigged craft during the decade of the 1850's, fell off in production to only 47 schooners in the 1860's and to just 57 in the 1870's. Other districts in eastern Maine experienced similar reductions.[54] Added to the decline in new construction was the swift extinction of nearly the entire fleet of vessels dating from the prewar period.

Nowhere was this dramatic loss more apparent than in the Penobscot region. Few of the large fishermen sailing out of Penobscot Bay ports in the 1850's remained in existence after the Civil War. Out of a group of sixty-eight such schooners built on the Bay in the dozen years between 1850 and 1861, forty-one were found in *American Lloyd's Registry of American and Foreign Shipping* for 1863. Their average age at that time was just eight years, nearly half having been built after 1855. Scarcely more than a dozen of these relatively new fore-and-afters continued on Lloyd's active list a decade later, and most of the survivors had gone into domestic short-haul coasting—the last refuge of worn-out fishing schooners—on a full-time basis.[55]

Altogether, approximately four-fifths of the Penobscot Bay schooners built in the period 1850-1861 were no longer afloat by the mid-1870's. Normal attrition in the course of day-to-day operations, through accident or natural disaster, accounts for some of this reduction in numbers, but certainly not all of it. Schooners of similar age and older continued to serve actively in the Massachusetts fisheries in substantial numbers during the postwar period. In 1882, about a quarter of the entire Bay State fishing fleet consisted of vessels built between 1836 and 1861 and ranging in age from twenty to forty-five years.[56] The comparatively rapid demise of their contemporaries in the Penobscot Bay fleet suggests that the eastern Maine vessels left something to be desired from the standpoint of longevity. This inherent weakness explains the suddenness, if not the underlying cause, of the disappearance of the region's fisherman-coasters.

The reason for the relatively short life-span of these vessels deserves some attention, since it represents still another instance of environmental and economic factors imposing themselves on the character of the New England fishing fleet. Basically, the problem had to do with construction materials. The archetypical Penobscot Bay fishing schooner of the pre-1860 period was built of mixed hard- and softwoods, a composition not conducive to maximum vessel life. 'Softwoods' included such easily worked coniferous species as pine, spruce, fir, larch, juniper (hackmatack) and hemlock, while 'hardwoods' referred to the less malleable but stronger and more durable deciduous species like oak, ash, chestnut, beech, birch, maple and elm. Vessels built of a combination of the two commonly had hardwood members in critical locations, such as the keel, sternpost, stem and frames. Softwood components were normally reserved for planking, deck timbers, cabins and the like.

The sample of forty-one fishermen referred to above will serve to illustrate the preference of Maine schooner builders for mixed-wood construction. Of the forty-one —most of them Grand Bankers built at Castine, Bucksport or Orland—all but three were constructed of mixed woods, and only two contained any substantial amount of oak. Moreover, in addition to conventional trunnel fastenings, almost three-quarters of the group had metal

53. *American Lloyd's Registry of American and Foreign Shipping, 1863* (New York: E. & G. W. Blunt, 1863), passim; *American Lloyd's Registry of American and Foreign Shipping, 1874* (New York: Society of the Board of American Lloyd's, 1874), passim; Colcord, passim; *Eastern Argus,* marine lists, 1853-1860, passim; *Republican Journal,* marine lists, 1850-1854, 1859, passim.

54. *U.S. Foreign Commerce and Navigation Reports,* 1850-1880, annual statements on shipbuilding.

55. *American Lloyd's Registry, 1863, 1874,* passim; Colcord, passim; *Eastern Argus,* marine lists, 1853-1861, passim; *Republican Journal,* marine lists, 1850-1854, 1859, passim.

56. *Record of American and Foreign Shipping, 1882,* passim; G. B. Goode et al., *Materials for a History of the Mackerel Fishery* (Washington: Government Printing Office, 1883), pp. 420-29, passim.

hull fastenings solely of galvanized iron, as opposed to the superior combination of copper and iron (Table II). In 1863, when still quite new (eighteen having been built after 1857), none of these schooners could command American Lloyd's prestigious 'A1' classification. All but two were given instead quality ratings of 'A2,' 'A2-' or 'A2½,' the three lowest of the seven ratings conferred by Lloyd's inspectors.[57]

An examination of 125 Cape Ann-built schooners dating from the same period (i.e., 1850-1861) presents a quite different picture. Of these vessels, all but 2 (98 percent) were found to be hardwood schooners composed primarily of oak, and all but 10 (92 percent) were fastened with a combination of copper and iron (Table II). As a rule, Massachusetts oak-built schooners were serviceable for thirty or forty years. 'Some of those Marblehead vessels can never wear out . . . ,' an admiring Nova Scotian fish merchant told an international fisheries panel in 1877.[58] Indeed, in 1882, the various North American fishing fleets contained nearly 50 Massachusetts hardwood schooners that exceeded thirty years of age, the oldest of them dating back to the 1830's.[59]

Compared to the Bay State fishermen, those built on Penobscot Bay had a rather short natural life-span. Twenty years was about the maximum for most of them. The few lasting beyond that length of time were ordinarily candidates for reconstruction, as was the case with *Patapsco* (97 tons, o.m.) and *G. M. Partridge* (98 tons, o.m.), two Down East Grand Bankers of the 1850's, which were rebuilt twenty and seventeen years, respectively, after their launchings.[60] Without such extensive refurbishing, the mixed-wood schooners of eastern Maine were prone to serious problems in their later years. They exhibited a marked tendency to develop leaks at inauspicious moments, often limping home in distressed condition or sinking on the fishing grounds while their crews took to the boats.[61]

As was the case with its design, the mixed-wood Maine fisherman-coaster of the mid-nineteenth century was something of a hybrid in terms of its construction—a cross between the hardwood schooner typical of the Massachusetts fisheries and the softwood schooner common in Atlantic Canada. An analysis of the Lunenburg (Nova Scotia) County cod-fishing fleet of 1886, based on eighty-six vessels appearing in the *Record of American and Foreign Shipping* for various years, highlights the increased tendency toward softwood construction as one moved steadily northeastward along the coast of North America. The Nova Scotia sample, made up entirely of vessels built within the province, included only six hardwood schooners, none of them oak-built. No fewer than eighty (93 percent of the total) were constructed of soft or mixed woods. Fully half had spruce timbers, and over a fifth contained only spruce. A majority, furthermore, were iron-fastened. The Gloucester District fishing fleet of 1882, in contrast, included 259 oak-timbered schooners among its native-built contingent of 267 vessels, and all but a handful were copper-fastened (Table II).

What this regional difference in choice of materials meant in pragmatic terms is evident from the opinions of contemporary observers. Builder E. H. Derby, testifying in 1869 before a congressional committee investigating the American shipbuilding industry, asserted that vessels constructed in the Canadian Maritimes had an average life of only six to eight years, compared to the overall American average of twelve or thirteen years and the thirty-year life-span common to the best quality Yankee-built craft.[62] Echoing that appraisal in the late 1870's, a partner in the fishing firm of Rowe and Jordan aired the prevailing Gloucester belief that a local hardwood schooner was as good after twelve years of service as a brand-new provincial schooner built of softwood.[63] In short, there was a manifest superiority on the part of Massachusetts hardwood schooners in terms of durability and Nova Scotia's softwood vessels suffered by comparison. It should be noted in defense of the Canadian builders that if carefully selected, properly seasoned timber was used, and if extensive salting was carried out, softwood schooners would give reasonably adequate service. Salting a softwood vessel, something done as a matter of course in the fisheries, could at least double her normally short life expectancy.[64] Nevertheless, an inherent qualitative difference still existed between Bay

57. *American Lloyd's Registry, 1863,* passim.

58. U.S., Department of State, *Documents and Proceedings of the Halifax Commission, 1877,* 45th Cong., 2nd Sess., 1878, House Exec. Doc. 89, p. 855. [Hereafter cited as *Halifax Comm. Proc.*]

59. *Record of American and Foreign Shipping, 1882,* passim.

60. *Republican Journal,* marine list, 7 October 1853, p. 3; *Eastern Argus,* marine list, 18 August 1855, p. 2; Colcord, p. 315; *American Lloyd's Registry, 1874,* p. 83.

61. *Eastern Argus,* marine lists, 20 September 1844, p. 3, 15 June 1849, p. 2, 11 September 1852, p. 2, 7 October 1854, p. 2, 22 September 1855, p. 2, 31 August 1857, p. 3, and 21 July 1876, p. 2.

62. U.S., Congress, House, Select Committee, *Report on the Causes of the Reduction of American Tonnage and the Decline of Navigation,* 41st Cong., 2nd Sess., 1870, House Rept. 28, p. 102.

63. *Halifax Comm. Proc.,* p. 2936.

64. J. G. B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914* (Cambridge: Harvard University Press, 1941), pp. 94, 410-11; see also Chapelle, *American Sailing Craft,* p. 151.

Table II

BUILDING MATERIALS USED IN SELECTED CLASSES OF NORTH AMERICAN FISHING SCHOONERS

Category	*Built of Hardwoods*	*Built of Mixed Woods*	*Built of Softwoods*	*Containing Oak*	*Containing Spruce*	*Copper and Iron Fastened*	*Iron Fastened*	*Size of Vessel Sample*
Penobscot Bay-built, 1850-1861*	3 (7%)	38 (93%)	0 (0%)	2 (5%)	NA	12 (30%)	29 (70%)	41
Cape Ann-built, 1850-1861**	124 (99%)	1 (1%)	0 (0%)	123 (98%)	0 (0%)	115 (92%)	10 (8%)	125
Lunenburg County Fleet, 1886 (Nova Scotia-built)†	6 (7%)	61 (71%)	19 (22%)	1 (1%)	42 (49%)	38 (44%)	48 (56%)	86
Gloucester District Fleet, 1882 (Massachusetts-built)‡	262 (98%)	5 (2%)	0 (0%)	262 (98%)	0 (0%)	257 (96%)	10 (4%)	267

* Sources: L. Colcord (comp.), 'Record of Vessels Built on Penobscot River and Bay' in *Sailing Days on the Penobscot,* by G. S. Wasson (Salem, Mass.: Marine Research Society, 1932), passim; *Eastern Argus* (Portland, Maine), marine lists, 1853-1861, passim; *Republican Journal* (Belfast, Maine), marine lists, 1850-1854, 1859, passim; *American Lloyd's Registry of American and Foreign Shipping, 1863* (New York: E. & G. W. Blunt, 1863), passim.

** Sources: *Record of American and Foreign Shipping, 1882* (New York: American Shipmasters' Association, 1882), passim; G. B. Goode et al., *Materials for a History of the Mackerel Fishery* (Washington: Government Printing Office, 1883), pp. 420-29, passim.

† Sources: *Lunenburg* (Nova Scotia) *Progress,* 24 October 1888, p. 2; *Record of American and Foreign Shipping, 1879, 1891* (New York: American Shipmasters' Association, 1879 and 1891), passim.

‡ Sources: *Record of American and Foreign Shipping, 1882,* passim; Goode et al., *Materials for a History of the Mackerel Fishery,* pp. 420-29, passim.

State and provincial fishing vessels, regardless of precautions taken in the building process.

Maine's mixed-wood fleet exhibited a similar inferiority to its Massachusetts counterpart, though to a lesser degree. The typical Maine schooner fell in between the two dominant regional extremes in North American fishing vessel construction. On balance, the state's builders were closer in their practices to the builders of the Maritimes than to their Massachusetts counterparts. They seldom produced vessels containing softwood alone, but neither did they employ white oak and other high-quality hardwoods. Moreover, like the Canadians, they tended toward lower-grade fastenings. As a result, their schooners exhibited a marked structural inferiority to those of southern New England.

It is reasonable to ask why the construction practices followed by Essex and Gloucester were not duplicated at Castine, Bucksport and other Down East building centers. The answer is essentially environmental. As Gloucester fish merchant Charles H. Pew pointed out with reference to the resources available to Canada's vessel builders, 'They have not the material in the provinces to build what we call a first-rate ship. They have not any white oak. . . .'[65] The same was true along the shores of Penobscot Bay and elsewhere in eastern Maine.

White oak, used in planking as well as framing, was historically the premier wood for vessel construction. Its strength, elasticity and keeping qualities were legendary. Massachusetts oak, in particular, was considered to be of superior quality.[66] Schooner builders in the Gloucester–Essex area had an adequate supply at their very doorstep, and were still able to satisfy their needs from the forests of their own state and nearby New Hampshire as late as the 1870's.[67] However, the great stands of white oak found along the Atlantic seaboard extended only as far north as extreme southwestern Maine. From Portland on up the coast, white oak was increasingly scarce, constituting a minor species in eastern Maine and a rarity in the Maritimes. Maine's own limited native oak supply, moreover, began to run out as early as 1830, forcing Down East builders to turn, of necessity, to a secondary supply of poorer timbers—miscellaneous native hardwoods like beech, birch and maple, and, increasingly, hackmatack and spruce.[68] In the western part of the state, this situation led to the development of a flourishing ship-timber trade with the Southern states, especially Virginia and Maryland, whose extensive oak forests were the most productive found along the East Coast. Beginning in the 1840's and continuing throughout the ensuing decade, cargoes of white oak from the Chesapeake were delivered at regular intervals to shipbuilders from Kennebunk to Belfast.[69]

In addition to white oak, Maine lacked hard yellow pine, a shipbuilding wood of almost equal importance. This species, called 'pitch pine' in the South, was valued for its strength and lack of acidity, and it was widely used in the planking of vessels, often serving as an oak substitute.[70] Essex builders, among others, regularly employed it for this purpose after 1870, though they continued to frame their hardwood fishing schooners in native oak.[71] Like white oak, yellow pine was brought into western Maine from the Southern states in large amounts during the 1840's and 1850's, mostly to building centers on Casco Bay and along the Kennebec River.[72]

On the eastern shores of Penobscot Bay and beyond, however, where Maine's antebellum fishing fleet was largely constructed, the timber trade with the Southern states was so small as to be almost nonexistent. Those rare occasions when Virginia oak and Georgia or Carolina pine went into eastern vessels were usually reserved for capital ships built at considerable expense for outside (typically Boston or New York) contract.[73] For local use—especially for lower priority vessels like fishing schooners—eastern builders and owners were content with native timber resources, which meant the region's distinctive mixture of secondary hard- and softwoods.

In terms of shipbuilding materials, the Maine woods represented a transitional zone between the predominantly coniferous softwood forest of Atlantic Canada and the largely deciduous hardwood forest of southern New England. Within that zone, the Penobscot region formed a rough demarcation line. East of Penobscot Bay, Maine's woodlands, like those in the Maritime Provinces, were essentially composed of spruce and fir with a small inclusion of secondary hardwoods. West of the bay, the state's timber growth was a balanced mixture of hard-

65. *Halifax Comm. Proc.*, p. 2906.

66. Hutchins, pp. 79-82; Hall, pp. 243-44.

67. *Halifax Comm. Proc.*, p. 2906.

68. Hutchins, pp. 80, 83, 93-94; Hall, p. 243; Greenleaf, p. 111.

69. Hall, p. 244; *Eastern Argus*, advertisement, 20 July 1848, p. 3; Ibid., marine lists, 5 August 1848, p. 2, 26 June 1855, p. 2, 17 December 1856, p. 2 and 10 March 1857, p. 2.

70. Hall, p. 246; Hutchins, pp. 96-97; Greenleaf, p. 110.

71. *Halifax Comm. Proc.*, p. 2906.

72. *Eastern Argus*, advertisements, 29 November 1847, p. 3, 29 June 1848, p. 2, 3 November 1854, p. 2, and 20 February 1855, pp. 1-2; Ibid., marine lists, 26 March 1847, p. 3, 11 December 1847, p. 3, 12 October 1848, p. 2, 26 July 1850, p. 2, 12 August 1852, p. 2, 1 December 1853, p. 2, and 26 September 1855, p. 2.

73. Ibid., marine lists, 16 November 1846, p. 2, 7 November 1851, p. 2, 21 July 1859, p. 2.

woods (beech, birch, maple) and softwoods (hemlock, spruce, white pine) more typical of northern New England but at variance with neighboring woodlands to the south in both its abundance of evergreens and its glaring lack of oak, hickory and other high-quality hardwoods. To the shipbuilder, then, Maine was mixed-wood country—the more so as operations moved west to east and the preferred hardwood stands gradually thinned out.[74]

Thus, convenience or easy access was one obvious factor in eastern Maine's unique choice of mixed building timbers, but another factor, economy, was equally important. Significant savings in basic harvesting costs and transportation freight charges could be realized by utilizing local supplies. Native hardwoods, for example, were available for twenty-two dollars per 1,000 board feet at Bath in 1855, compared to twenty-eight dollars for Southern pitch pine and thirty-five dollars for Southern white oak.[75] Eventually, the tendency of eastern Maine builders to resort to the cheapest timber most readily at hand led mariners and others to adopt the shorthand term 'Eastern built' to describe vessels fashioned Down East of low-cost native wood stocks.[76] As late as 1882, by which time the use of imported supplies had become almost universal at the major yards to the westward, builders in remote Washington County were still venturing into the nearby forests during the winter months to cut frames for their schooners.[77]

Bark *Sarah L. Bryant* (357 tons, o.m.), built at Castine in 1847, was representative of the type of craft ordinarily laid down in eastern Maine shipyards. According to a signed memo of agreement between the owners and builders, the vessel was 'to be built of this country [sic] wood with the exception of the Upper Apron piece, Stern Post, Rudder Post, Windlass, Windlass-bitts, Hatchcombings, caps, tops and bolting streak, which are to be of White Oak.' Those few construction features aside, the builders were instructed to rely exclusively on cheap and readily available mixed woods from nearby forests. Beech, birch and maple were ordered for the keel, keelson, stern, lower apron pieces, floor and naval timbers, buttocks, bow and run timbers, wales and outside planking under the wales. Juniper was selected for the top and counter timbers, main transom, stanchions, deck frames, ceiling planks and knees. White pine was chosen for the bulwarks and deck planking, and red oak for the railings. The total cost was placed at thirty-four dollars per ton.[78] That was considerably below the forty-five dollars per ton charged by contemporary Bath shipbuilders for hulls of white oak and Southern pine.[79]

The timber selected for *Sarah L. Bryant* was almost certainly typical of the mix used in regional fishing schooners. If anything, schooner builders may have placed an even greater reliance on softwoods, which were inexpensive and increasingly available as one moved eastward along the coast. It was primarily the existence of cheap and abundant softwood timber in the Maritime Provinces, for instance, that allowed Canadian builders of the 1870's to turn out fishing schooners at half the cost of comparable hardwood vessels built in the shipyards of southern New England.[80] At any rate, there was little disposition among eastern Maine builders to import oak. On the record, only two of the antebellum salt bankers launched in the Penobscot region after 1850 contained any oak, and neither was fully oak-built (Table II).

During the post–Civil War period, some Maine yards —notably in the western part of the state—did use oak in the building of schooners. Bath fishermen were almost uniformly white oak vessels in the 1870's and 1880's. This, however, resulted from the peculiar economics of fishing schooner construction in Maine after 1865—namely, the production of quality craft for out-of-state customers (who could afford the best in imported materials) at a few select shipyards specializing in such work.[81] Historically, the majority of Maine schooner builders, like those in the Maritimes, were restricted to what was immediately available at reasonable cost. The local market demanded cheap vessels, and until the post–Civil War years, it was the local market most builders served.

In the final analysis, the antebellum fishing schooner of Down East Maine was an accurate reflection of its

74. R. Zon and W. N. Sparhawk, *Forest Resources of the World*, Vol. II (New York: McGraw-Hill Co., 1923), plates facing pp. 496, 522; N. Jorgensen, *A Guide to New England's Landscape* (Chester, Conn.: Pequot Press, 1977), pp. 143, 147, 179, 200; E. Espenshade, Jr. (ed.), *Goode's World Atlas: Physical, Political and Economic* (9th ed. rev.; New York: Rand McNally Co., 1953), p. 53.

75. Hall, p. 103.

76. *Eastern Argus*, marine lists, 18 February 1843, p. 3, 8 January 1844, p. 3, 27 April 1847, p. 3, 9 November 1853, p. 2, and 2 October 1860, p. 2; see also *Eastport* (Maine) *Sentinel*, advertisement, 23 April 1856, p. 3.

77. Hall, p. 102; *The Mining and Industrial Journal* (Bangor, Maine), 22 December 1882, p. 4.

78. PMM, WP, Bark *Sarah L. Bryant* Collection, file 1: Memo of agreement between S. & J. H. Noyes & Co., W. Witherle, L. Gay and J. Dresser, 22 December 1846.

79. Hall, p. 103.

80. *Halifax Comm. Proc.*, pp. 2992, 3049, 3075.

81. *Record of American and Foreign Shipping, 1882*, passim; O'Leary, pp. 695-96.

regional economy and ecosystem. Its design was a consequence of the nonspecialized usage which local economic needs demanded and the architectural characteristics which the immediate coastal environment allowed. Its construction features were similarly an outgrowth of financial cost considerations combined with the nature and composition of nearby interior woodlands. These factors, essentially regional in scope, shaped the development of what might be called Maine's most representative, if forgotten, class of vessels. The distinctive mixed-wood fisherman-coaster, with all of its inbred strengths and weaknesses, was, at bottom, a rational technological response to the economic and environmental imperatives of its time and place.

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An Inquiry into the Troop Strength of King Harald Hardrada's Invasion Fleet of 1066

By Miles W. Campbell

IN September of 1066 King Harald Sigurdson 'Hardrada' of Norway and his ally Earl Tostig, the exiled brother of King Harold Godwinson of England, launched a large Viking army against Northumbria, the first step in a projected conquest of the Anglo-Saxon kingdom. Scholars have long recognized the significance of this assault as a factor in determining the outcome of the contest waged in that year for possession of the English throne. On 20 September the invaders severely mauled the levies of Northumbria and Mercia at Gate Fulford, close by the city of York. Five days later the Norwegian monarch and virtually his entire army were annihilated when they engaged King Harold and his troops, who had made a forced march from London, at Stamford Bridge. On the twenty-eighth of that same month, but three days after the Anglo-Saxon triumph, Duke William of Normandy landed with his army at Pevensey in southern England, intent upon asserting his own claim to the crown of England. Harold, informed of his Norman adversary's landing, quickly marched with the survivors of Stamford Bridge the 250 miles south to Hastings and the fate that awaited him on 14 October.

It may be assumed that the English monarch, in the fortnight allowed him between the two battles, was able to rally some additional men to his ranks.[1] Similarly, it might be argued that Harold's defeat at Hastings could be attributed, if only in part, to his having committed his forces, whether accidentally or deliberately, prematurely to battle.[2] At the same time, there can be little doubt but that the cream of his military, his royal housecarles and the housecarles of his brothers Earls Leofwine and Gyrth —the troops who had unquestionably borne the brunt of the fighting at Stamford Bridge—marshalled ranks before Duke William that were severely thinned by the northern engagement and the subsequent trek south. It is interesting, if wholly futile, to speculate upon the outcome of the confrontation between King Harold and the Norman duke had the former gone into battle quickly after William's landing at a place of his own choice with his elite troops unscarred by such recent combat.

Extensive efforts have been made over the decades by scholars to determine the size of the two armies that clashed at Hasting: the results of these studies have shown wide variations.[3] Similar, if

1. According to Ordericus Vitalis, Harold paused six days in London assembling an army: *Historia Ecclesiastica,* ed. A. Le Prévost (Paris, 1838-1855), ii, 146 and interpolation in William of Jumièges, *Gesta Normannorum Ducum,* ed. J. Marx (Rouen and Paris, 1914), p. 196. Gaimer placed him in the city for five days: *Lestoire des Engles,* ed. C. T. Martin, Rolls Series (London, 1888-1889), i, 223 and ii, 166. See also, D. C. Douglas, *William the Conqueror* (London, 1964), pp. 197, 399, where it is suggested that, in view of the speed of his march south, the stay in London would not have been of sufficient length to permit Harold to replace the infantrymen who had been unable to keep up with his mounted troops. The assertion is found in the sources that Harold did, indeed, go into battle before his full army had time to assemble: MS. E, *Anglo-Saxon Chronicle,* ed. by D. Whitelock, D. C. Douglas and S. I. Tucker (London, 1961), p. 41; Florence of Worcester, *Chronicon ex Chronicis,* ed. B. Thorpe (London, 1848-1849), i, 227.

2. A reasonable interpretation of Harold's intentions at Hastings is that it was his plan to repeat the tactics that had brought him victory at Stamford Bridge—a rapid advance of his forces culminating in a night or surprise attack upon the Normans. This plan went awry when Duke William's scouts informed him of the approach of the English, forcing Harold to assume a defensive position: R. Allen Brown, *The Normans and the Norman Conquest* (New York, 1969), pp. 169-70; Douglas, *William the Conqueror,* p. 197.

3. While medieval sources (William of Poitiers, *Gesta Guillelmi ducis Normannorum,* ed. and trans. by R. Foreville, [Paris, 1952], pp. 150, 170 and Ordericus Vitalis, *Historia Ecclesiastica,* ii, 144) speak of William having brought between 50,000 and 60,000 fighting men with him to England, modern scholars have tended to be more moderate. At one extreme one finds estimations of from 10,000 to 11,000 Anglo-Saxon troops and 10,000 to 13,000 Normans (C. Oman, *A History of the Art of War in the Middle Ages,* [New York, 1924], i, 156-58; E. Renouard Jones, 'The Battle of Hastings, 14th October, 1066,' *The Royal Engineers Journal,* V, [1907], 21, 26) to a low of between 4,000 and 5,000 men: J. F. C. Fuller, *A Military History of the Western World* (New York, 1954), pp. 371-74. More frequently, however, the tendency has been to place the numbers on either side at about 7,000 men: Douglas, *William the Conqueror,* pp. 196-99; W. Spatz, *Die Schlacht von Hastings* (Berlin, 1896), pp. 26-30, 33-34; J. Beeler, *Warfare in England 1066-1189* (New York, 1966), pp. 11, 16. All of these estimations are, as Brown observed, 'more or less rational guesswork proceeding from the principle of reducing the conventional and picturesque exaggerations of medieval chroniclers to a consideration of such factors as the number of ships in William's fleet and their capacity, the time taken by the Normans to embark and disembark, and the position and disposition of Harold's army at Hastings.' Brown, *The Normans,* p. 150, fn. 47. A fundamental problem encountered in this approach to calculating the size of the Norman's

less intensive efforts have been made to ascertain the size of the force hurled against England by King Harald of Norway in the fall of 1066. Here, again, the results of these investigations have revealed marked disagreement among scholars, estimates ranging from as few as 5,000 to as many as 18,000 troops.[4] In view of the importance of the Norwegian assault upon the island realm as a factor contributing to the ultimate triumph of the Conqueror, it would be desirable to determine, as closely as possible, the scale of that operation. It would be, of course, absurd to suggest anything other than a rough estimate of the number of men involved, for there are too many variables involved and too much information that would be required that is simply not extant. In particular, difficulty is encountered in determining a reasonable estimation of the size of the fleet that transported the Norwegian's army to the shores of England and, an even greater obstacle, ascertaining the carrying capacity of the vessels that composed that armada. In spite of these problems it is still possible to get a relatively clear idea of the strength of the invasion force that confronted the Anglo-Saxons in Northumbria in September of 1066. The picture that emerges is of an army considerably larger than that it is believed Duke William brought with him to England.

The most colorful description of King Harald's preparation for and invasion of England is to be found in 'King Harald's Saga' of Snorri Sturlason, an Icelandic skald writing in the early thirteenth century.[5] According to that writer the Norseman sailed from the Solund Islands of his native land with 'nearly two hundred [240] ships not counting merchant ships carrying provisions and lesser vessels.'[6] The *Anglo-Saxon Chronicles* speak of the invasion fleet having numbered 300 vessels[7] or of it having been simply 'very large.'[8] Florence of Worcester[9] stated that it contained 500 ships and Marianus Scotus,[10] whose assertion may be disclaimed, referred to an armada of 'nearly a 1000 vessels.' It is possible that the difference in the size of the fleet as spoken of by Snorri and the English sources simply reflects the fact that the skald did not include in his count 'merchant ships carrying provisions and lesser vessels' while the latter did. It should be recalled, too, that the fleet that sailed from the Solund Islands was soon augmented by the levies imposed upon King Harald's vassals Jarls Paul and Erland of the Orkneys and the contribution of Earl Tostig.[11]

Unquestionably when, in dealing with the 'Age of the Viking,' one treats with references in the sources to the size of military and naval forces, extreme caution must be exercised. This is true, of course, when dealing with such figures throughout the medieval era and other ages

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force is the great uncertainty as to the number of vessels in his fleet—medieval references range from 696 ships (Wace, *Roman de Rou*, trans. E. Taylor, [London, 1837], p. 120) to between 9,000 and 11,000 (Gaimar, *Lestoire de Engles*, cited in Freeman, *The Norman Conquest*, [Oxford, 1875], iii, fn. 3), while modern estimations vary from Fuller's 450 (op. cit., p. 372) to Spatz's 1,500 (op. cit., p. 28). In addition to this problem, little is known of the probable markedly varied capacity of the vessels that composed the Norman armada.

4. A. H. Burne, speaking of a fleet of 300 ships having sailed from Norway, held that the invasion force would have numbered about 5,000 men, an average of less than 17 men to each vessel: *More Battlefields of England* (London, 1952), pp. 83, 90. At the other end of the numerical spectrum, F. W. Brooks held that the Northman's force may have contained as many as 18,000 troops carried in 300 vessels, an average of 60 men to each craft: *The Battle of Stamford Bridge*, E. Yorks Loc. Hist. Soc. (1956), pp. 10-11. He is seemingly followed by Rupert Furneaux who, suggesting that a vessel of a configuration similar to the Gokstadt ship would carry 64 men, spoke of the Norwegian fleet that sailed from the Solund Islands having consisted of '200 long-ships and 40 smaller vessels,' an average, in fact, of 75 men to each ship: *Conquest 1066* (London, 1966), p. 84. Between these extremes are those who held that King Harald's fleet, numbering 300 ships, brought 9,000 men to England: M. Magnusson and H. Palsson, eds. *King Harald's Saga* (Harmondsworth, 1966), p. 139, fn. 2; G. Jones, *A History of the Vikings* (London, 1968), p. 410. Others speak simply of the Norse armada having been 'large,' one of 300 or more vessels: F. M. Stenton, *Anglo-Saxon England*, 3rd ed. (Oxford, 1971), p. 588; Brown, *The Normans*, pp. 154-55; Douglas, *William the Conqueror*, p. 193.

5. In addition to describing the preparations for invasion, Snorri spoke of the omens of foreboding that filled King Harald's men as they readied for the assault: a fearful ogress who, in the dream of one Gyrdir, chanted that 'Norway's warrior sea-king has been enticed westward to fill England's graveyards'; to the monarch himself appeared the spectral image of his half-brother St. Olaf who warned '. . . now I fear, great Harald, that death at last awaits you, and wolves will rend your body'; pp. 139, 141.

6. Ibid., p. 139. While the editors of this edition of the saga spoke simply of 200 ships, it has been suggested elsewhere that the figure cited by Snorri should be interpreted on the basis of the Old Norse numerical usage, an interpretation that would indicate in fact 240 ships: *Heimskringla: History of the Kings of Norway*, ed. and trans. by L. M. Hollander (Austin, 1964), p. 645; P. DuChallu, *The Viking Age* (New York, 1890), ii, 505.

7. MSS. D and E, p. 141. So, also, William of Malmesbury, *De Gestis Regum Anglorum*, ed. W. Stubbs, Rolls Series (London, 1887-1889), i, 386.

8. MS. C, p. 142.

9. I, 226.

10. Cited in Freeman, *Norman Conquest*, iii, 141, fns. 2, 3.

11. *King Harald's Saga*, p. 141, where there is no indication of the size of the fleet provided by the brother jarls other than that it was 'a large force.' Tostig, according to Florence of Worcester (i, 225-26) and the *Anglo-Saxon Chronicle* (MS. C, p. 142) met Harald at the Tyne Mouth. The English earl, who in May of 1066 had launched a raid on the southern and eastern coasts of his native land, had continued on to Scotland with 'twelve small ships': ibid., MS. D, p. 141. That, having spent the summer in Scotland, he was able to recruit at least a few of the fighting men of that land was suggested by Adam of Bremen, who spoke of the presence of Scottish troops in King Harald's army: *History of the Archbishops of Hamburg-Bremen*, ed. and trans. by F. J. Tschan (New York, 1959), p. 159.

as well. Certainly it has been shown that the 'Great Army' which swarmed across England in the ninth century and other such 'hordes' of Norsemen that descended upon many regions of western Europe were, in fact, frequently numerically relatively small.[12] The Scandinavian world of the earlier centuries was not, however, the same as that of the eleventh century. In Norway, Denmark and Sweden national monarchs had come to power, men more able to muster the manpower of their lands and channel it into policies designed to foster 'the interests of the state.' The assault mounted by Sweyn Forkbeard on England in the early eleventh century was a Danish 'national' operation, not simply a series of independent raids undertaken by individual aristocrats and adventurers in quest of loot, glory and perhaps land as had frequently been the case earlier. This enhanced power of the northern monarchs was to be discerned, as befit peoples with strong maritime traditions, in their organization of the naval strength of their lands into cohesive elements that they could direct 'as part of an over-all political strategy.'[13] This increased power of the Scandinavian monarchs was revealed in their creation of ship districts throughout their countries. Local fleets, based upon these districts, could be combined with a central fleet, built by and for the monarch, when circumstances demanded.[14] By the thirteenth century it would appear that in Norway the full muster of these ship districts—*ledung* ships—numbered 310 or more vessels.[15] Tradition has it that such a system of musterships began in Norway about 950:[16] by 1066 King Harald, one of the most authoritarian rulers in the Scandinavian world of his age, would have been in a position to call upon his subjects for a significant number of ships to transport his invasion force to England. The approximately 200 warships spoken of by Snorri as having sailed under King Harald's command does not seem, then, unduly large.

The mere size of the fleet, however, provides little information in itself as to the actual size of the military force it transported. Clearly to ascertain that it is necessary to have more precise knowledge of the size of the vessels involved and their probable complements. Obviously any detailed information related to these questions is impossible to obtain from the scant words of the sources. Yet if specific evidence is lacking, it appears possible to reach some general conclusions by an examination of what is known of Scandinavian naval usage in the eleventh century. The initial conclusion reached from such a study is that past investigations of these questions have tended to be made on the premise that Scandinavian ships and naval practices underwent little or no change in the decades between the ninth and eleventh centuries. This was, in fact, not the case; 'The design of the Viking ship was by no means static. It too was improved as the potential of the type was explored.'[17]

Two of the most famed of Viking ships that, through the skillful restoration work of archaeologists, have been preserved for the eyes of both admiring amateurs and studious experts are the Oseberg and Gokstadt grave ships. Dated to circa A.D. 800, the Oseberg ship, over 64 feet long and 15 feet broad amidships, carried thirty oars, fifteen to a side. The Gokstadt ship, built between A.D. 850 and 900 was 76.5 feet long with a beam of 17.5 feet and was designed to carry thirty-two oars. As there was *at least one* man assigned to each oar, it is obvious that the minimum complement under normal circumstances would have been thirty men for the Oseberg ship and thirty-two for the Gokstadt ship. However, since it was customary to carry extra rowers and other supernumeraries, it would not be out of line to suggest that a normal crew might have consisted of as many as forty to forty-five men.[18] It is perhaps noteworthy that the Gokstadt ship, when found, carried sixty-four shields, two to each oar hole.[19] It is the conclusion of eminent scholars that

12. P. H. Sawyer, *The Age of the Vikings* (London, 1962), pp. 121-22, where it is argued that the Viking armies that raided England in the ninth century should be numbered in the hundreds, not thousands, a view accepted by Jones, *The Vikings*, p. 218, fn. 1. See, however, Stenton, *Anglo-Saxon England*, p. 243, fn. 1, where it is contended that 'Without laying any stress on details, it is safe to conclude that the size of a large viking army should be reckoned in thousands rather than hundreds.'

13. R. W. Unger, *The Ship in the Medieval Economy 600-1000* (London, 1980), p. 107.

14. Ibid., p. 135.

15. Ibid., according to Unger the full Norwegian ship muster was never called out and, prior to the thirteenth century, the largest muster was 200 ships. Presumably to this number should be added the vessels of the central fleet and those of the aristocracy of the realm.

16. Ibid., p. 155, fn. 16. The system was attributed to King Hakon the Good. As that monarch had spent his youth at the court of King Aethelstan of England, it would seem probable that he copied, at least in part, the already existing Anglo-Saxon naval organization: A. R. Lewis, *The Northern Seas: Shipping and Commerce in Northern Europe A.D. 300-1100* (Princeton, 1958), p. 449 and fn. 263. Although it has been asserted that the Norse musterships were intended for defense alone (ibid.), there is no doubt that King Harald, even before his great assault on England, had mounted other large-scale naval forces for operations that were hardly 'defensive': Jones, *The Vikings*, p. 410.

17. Unger, *The Ship*, p. 81.

18. For descriptions of these vessels, see: P. G. Foote and D. H. Wilson, *The Viking Achievement: A Survey of the Society and Culture of Early Medieval Scandinavia* (New York, 1970), pp. 242-49; J. Simpson, *Everyday Life in the Viking Age* (London, 1966), pp. 75ff.; A. W. Brøgger, 'The Oseberg Ship,' in *Saga Book of the Viking Society*, X (1919-1924), 91-108; Jones, *The Vikings*, pp. 186-89; Unger, *The Ship*, p. 242.

19. Foote and Wilson, *The Viking Achievement*, p. 243.

both of these vessels were of a type known as *karfi*.[20] References to craft of this class found in Russian and Byzantine sources tend to confirm the view that a complement of from forty to forty-five men would be normal for such vessels.[21] This being the case, it would appear that several of the estimations that have been advanced for the size of King Harald's invasion army have been based on the assumption that all of the vessels in his fleet were of a size similar to the Oseberg and Gokstadt ships or, indeed, either smaller or undermanned.[22]

The validity of this premise is, however, open to serious question. It has been argued, on one hand, that vessels of this configuration were not designed for voyages on the high seas, having, rather, been intended primarily for use on fjords, rivers, lakes and more placid waters such as the Baltic.[23] This argument, it must be conceded is questionable, for in modern times ships modelled after these craft have demonstrated their ability to navigate successfully the stormy waters of the North Atlantic.[24] Yet even if one accepts the view that such vessels were, as seems to have been the case, utilized for transporting men across the North Sea, the fact remains that they were not necessarily representative of the ships that would have been found in a Norse invasion fleet of 1066: naval technology in the northern lands was not, as has been observed, 'static.'

In the tenth and eleventh centuries the trend in Scandinavian shipbuilding was toward larger vessels with the size of the crews enhanced: 'The leading figures in the Scandinavian kingdoms insisted that builders construct the largest possible warships.'[25] In these newer, larger craft size was reported by 'rooms,' a room being the space between two of the ship's ribs occupied by a minimum of two oarsmen. Craft having between six and sixteen pairs of oars were too small to be measured by rooms. Vessels having fifteen or more rooms were classified as 'longships,' while those with thirty or more rooms were designated *draki* or 'dragons.'[26] There are a number of references in the northern sources to vessels of the dragon class from A.D. 995 onward.[27] King Harald himself is said to have had built for his personal use such a vessel, *Bussen*, a ship reputed to have had thirty-five rooms.[28] It has been contended that ships of this size were less seaworthy than those of a smaller size and, consequently, would have been used primarily as 'ships of state' or, if taken into battle, would have been restricted in their use to naval engagements in sheltered waters.[29] It has, further, been asserted that 'there is no record of them on voyages west or south-west, nor could they have survived the hazards of storm and rough water in the North Sea, to say nothing of the Atlantic Ocean.'[30] This is not

20. Ibid., p. 236; H. Shetelig and H. Falk, *Scandinavian Archaeology*, trans. by E. V. Gordon (Oxford, 1937), p. 371; T. Sjøvold, *The Oseberg Find and other Viking Ship Finds* (Oslo, 1959), pp. 20, 57. A. W. Brøgger and H. Shetelig, *The Viking Ships; Their Ancestry and Evolution* (Oslo, 1951), pp. 174, 177.

21. Constantine Porphyogenetus, in *De Cermona*, notes that twenty 'pamphyles,' a vessel similar to the *karfi*, carrying 830 men took part in an attack on the Greeks—an average of approximately 41 men to each vessel: cited in S. A. Anderson, *Viking Enterprise* reprint (New York, 1966), p. 67. Reference is found in the *Russian Primary Chronicle* to Oleg, a Varangian prince of early Kievan Russia, having levied tribute on the basis of 40 men to a ship: ed. and trans. by S. H. Cross and O. P. Sherbowitz-Wotzer (Cambridge, Mass., 1953), p. 64. M. Pokrovski held that between the tenth and the twelfth century the ships of the Vikings within Russia, which were similar to the grave ships, carried crews of from 40 to 60 men: *History of Russia*, ed. and trans. by J. D. Clarkson and M. R. M. Griffiths (New York, 1931), p. 35. The word *karfi* itself is said to have come from the Greek word *karabos* used by Byzantine writers to designate the Varangian ships in the Byzantine navy. 'From the mention of the *karves* in old writings it is evident that they correspond very closely to the boats found in the grave-mounds. Like them they were light boats *with a relatively small crew* [italics mine]': Brøgger and Shetelig, *The Viking Ships*, pp. 175-76. Lewis, speaking of the Gokstadt ship, held its normal crew would have been 40 men, although it was capable of carrying up to 70. Discussing the Skuldelev shipwrecks, which have been dated to the early eleventh century, Ole Crumlin-Pedersen and Olaf Olesen held wreck 5—a 'typical, medium-sized "warship" or "Viking ship"' of twelve pairs of oars would have carried a crew of from 26 to 30 men: 'The Skuldelev Ships,' *Acta Archaeologica*, XXXVIII (1967), 144-45, 170. While Lewis (*The Northern Seas*, p. 242) and the editors of *The Viking Achievement* (p. 242) suggested that the Gokstadt ship carried a crew of 70, P. H. Sawyer tended to minimize the complements of craft of that type, at least on the high seas, holding that more than 35 men in such operations would have been unlikely: *The Vikings*, p. 71.

22. *Supra*, fn. 4.

23. 'The Gokstadt ship with its broad hull and high boards, was altogether more seaworthy [than the Oseberg ship], but it lacked all the equipment which would be needed on a voyage to foreign waters': Brøgger and Shetelig, *The Viking Ships*, pp. 174, 177. Similarly T. Sjøvold, while holding that the Gokstadt ship was 'distinguished by a more solid construction throughout' than the Oseberg vessel, viewed it too as a *karfi*, 'a smaller vessel for cruising along the coast': *The Oseberg Find*, p. 57. So, too, Unger, *The Ship*, p. 83.

24. P. H. Sawyer, while viewing the Oseberg ship as primarily a coastal and riverine craft, held that the Gokstadt vessel, far more sturdily built, was typical of the ships used by the Vikings for their overseas raids: *The Vikings*, pp. 68ff. This view was also held by Jones, *The Vikings*, p. 190; Lewis, *The Northern Seas*, p. 242; Foote and Wilson, *The Viking Achievement*, p. 234: Simpson, *Viking Age*, p. 81. Strong evidence for the sea-going capability of vessels of the Gokstadt type was given in 1893 when Captain Magnus Andersen sailed a copy of that ship from Norway to Newfoundland to be the Norwegian exhibit at the Chicago World Fair. The voyage, from 30 April to 27 May, saw the ship survive several storms without damage and achieve a maximum speed of ten to eleven knots under sail.

25. Unger, *The Ship*, p. 133.

26. Ibid.

27. Brøgger and Shetelig, *The Viking Ships*, pp. 190ff.

28. Ibid., p. 192; *King Harald's Saga*, pp. 107-08.

29. Jones, *The Vikings*, pp. 189-90.

30. Ibid., p. 190.

entirely true for, while there is no word of there having been vessels of such scale braving the Atlantic, one does hear of them in the North Sea. *Kristsuden,* a warship of thirty 'benches' or rooms, was built in 1262-1263 to serve as the flagship in the expedition of King Hakon of Norway against Scotland.[31] In 1150 Jarl Rognvald of the Orkneys reputedly had a vessel of thirty-five rooms built which he sailed from Norway to his home in the islands.[32] Although it is not clear, the implication found in 'King Harald's Saga' is that it was aboard *Bussen,* a ship of thirty-five rooms, that that monarch sailed for his final, great adventure in England.[33]

Even if the alleged lack of seaworthiness of these great *draki* is open to question, it must be admitted that while a Norse invasion fleet, particularly one under the command of the Norwegian monarch and numbering in its ranks some of the great nobles of that land, would probably have included a few vessels of that scale, they were not the standard sized vessels. The customary vessel demanded of the ship-districts throughout the Scandinavian world was the *tvitugsessa,* a ship of twenty rowing benches or forty oars.[34] Of the five vessels recovered from Roskildefjord at Skuldelev, Denmark, all of which dated from the early eleventh century, wreck 2, the largest of the vessels, was a true warship, one of no fewer than forty oars and perhaps as many as sixty.[35] It has been estimated that it carried a complement of from fifty to sixty men.[36] As the Skuldelev ships were presumably of Danish origin, it should be observed that Norwegian vessels tended to be larger in size and complements.[37]

If one advances on the premise that a sizable number of the warships in King Harald's invasion fleet were ships of the *tvitugsessa* class, the twenty-room vessels that constituted the normal ship levy imposed upon the ship-districts of Scandinavia, it is evident that at least that portion of the armada would have been capable of transporting a number of men greater than the thirty to thirty-five average seemingly attributed to all of the vessels by many scholars. This is all the more true when it is perceived that at least some of the ships were probably twenty-five-room vessels, a size also popular in Scandinavia.[38] The possible presence of a few *draki* class craft, while probably enhancing the impressive appearance of the fleet, would have had little impact upon the overall size of the army. Consideration must be given too, of course, to the possibility that there were a number of smaller ships in the fleet, a factor that would tend to reduce the size of the force it carried to England.

It would seem clear, then, that there is sufficient evidence, on one hand, to indicate that the Norwegians, through their system of ship-districts, would have been in a position in 1066 to raise a fleet of at least two hundred warships and, moreover, that the complements of many of those vessels would have exceeded the thirty or forty men presumably found on smaller ships such as the ninth century Oseberg and Gokstadt ships. The precise composition of the fleet in terms of the types of warships cannot, of course, be determined. Too, while it has been asserted that the average size crew of Norwegian warships of the thirteenth century was about one hundred men,[39] it is not necessary or probably valid to attribute

31. Brøgger and Shetelig, *The Viking Ships,* pp. 206-07.

32. *The Orkneyinga Saga,* trans. by A. B. Taylor (Edinburgh, 1938), pp. 282-83.

33. Pp. 107-08, 139. The complement that could be carried by such large craft, at least in more tranquil waters, was clearly great, dragon-ships of from thirty to thirty-seven rooms reputedly having eight men to a room: Unger, *The Ship,* p. 134. Vessels of this scale, it must be conceded, were rare, only sixteen having been recorded in Norway for the period A.D. 995 to 1263: ibid.; Brøgger and Shetelig, *The Viking Ships,* p. 192.

34. Foote and Wilson, *The Viking Achievement,* p. 235. 'The standard levy ship all over Scandinavia seems to have been the "twenty-bencher," although some smaller ones might be included and there were bigger ships with twenty-five or thirty or more rowing benches.' See also, Shetelig and Falk, *Scandinavian Archaeology,* p. 375; Lewis, *The Northern Seas,* p. 449; Unger, *The Ship,* p. 135. As in the case of the *draki,* the complements of twenty- and twenty-five-bench vessels were measured by the number of men carried in each room. According to Unger 'the optimal size of a longship was twenty to twenty-five rooms with 10 men per room': ibid. J. Simpson observed that later medieval ship levies demanded 3 men for each oar: *The Viking Age,* pp. 85-86. While crews of 200 to 250 men might have been used in engagements fought in calmer waters, it is unlikely they would have been found on vessels crossing the North Sea.

35. Unger, *The Ship,* p. 89. The initial estimate of the length of wreck 2 was approximately 91.8 feet (28 m.): Olesen and Crumlin-Pedersen, 'The Skuldelev Ships,' p. 118. This has subsequently been revised upward to c. 104. 9 feet (32 m.): Unger, op. cit., pp. 115, fn. 15, and 153.

36. While 'neither the extent of the deck nor the number and positions of the oars can be established, but the ratio of c. 6:1 between the length and breadth, as well as the fairly shallow mast step in the keelson, indicate that this was a true Viking ship designed to carry a company of warriors—perhaps as many as 50-60—across the sea, disembarking them on a sandy shore or up rivers far inland': Olesen and Crumlin-Pedersen, 'The Skuldelev Ships,' p. 118.

37. Such, at least, was the case in the thirteenth century: Foote and Wilson, *The Viking Achievement,* p. 281.

38. Brøgger and Shetelig, noting that ships of the great *draki* class were certainly the exception in Scandinavian shipbuilding, observed 'so it is probable that the second class of great ships, *the ships of 20 to 30 rooms,* counted for most. Especially it looks as if the middle class, those of 25 rooms (the *twenty-fives*) were the most suitable and most effective. And we know a great deal about these ships . . . as demands increase we see the most skilful shipbuilders in the country [Norway], as well as the military experts, fixing on the 25 or 26 thwart as the best and most effective size of longship. This seems to have been established in the eleventh and twelfth centuries': *The Viking Ships,* pp. 207-08.

39. Foote and Wilson, *The Viking Achievement,* p. 281.

complements of this size to Norse warcraft of the mid-eleventh century, particularly vessels engaged in an elaborate operation across the waters of the North Sea. Still, if one calculates only an average of fifty to fifty-five men to a ship, a figure only slightly higher than the crews of vessels of a period two hundred years earlier, it would have been possible for two hundred warships to have transported between ten thousand and eleven thousand men. To this number, in all likelihood, should be added the crews of the 'merchant ships carrying provisions and lesser vessels' alluded to by Snorri Sturlason and whatever vessels may have been contributed to Harald's fleet by the jarls of the Orkneys and Shetlands and his ally Earl Tostig, vessels that perhaps brought his armada close to the three hundred ships spoken of by the most conservative of English chroniclers. As in the case of Scandinavian warships, the merchant vessels of that region came in various configurations, configurations that differed with the passing of time. The *knarr,* a large seagoing vessel used for long-distance voyages to Iceland and Greenland from A.D. 870 onward, could carry up to thirty family members together with their cattle, goods, fodder and furniture.[40] Two of the ships recovered at Skuldelev were cargo vessels: the smaller, a craft designed for Baltic trade, could handle perhaps nine tons with a crew of from ten to twelve men while the larger had a capacity of thirty tons and a complement of about twelve men.[41] If one combines the lesser vessels of King Harald's fleet that sailed from Norway, the levy of warships drawn from the Orkneys and Shetlands and the contribution of Earl Tostig, viewing it as a mixed bag of merchant ships and warcraft numbering but fifty ships with an average complement of twenty men, an additional one thousand men, men who could be pressed into military service if it proved necessary, should be added to King Harald's army, bringing it to between eleven thousand and twelve thousand men.

In the thirteenth century figures indicate that a full levy of Norway's fighting men could turn out a force a little over thirty thousand strong.[42] 'It became the accepted custom, at least in Norway, that a full levy could be called out for defensive purposes, a half-levy if aggression was intended.'[43] Snorri did, in fact, assert that King Harald, having determined to invade England, sent out a call for the mustering of one-half of his realm's warriors.[44] Allowing for a smaller population in the eleventh century than in the thirteenth, a force of between eleven thousand and twelve thousand men would seem to have been well within Norway's ability to raise, particularly if augmented by men drawn from King Harald's allies.

Previous efforts to determine, if but roughly, the strength of the Norwegian invasion force of 1066 have been based, as has been noted, upon the premise that the vessels which transported it to England were of a configuration similar to the best-known warships of the ninth century. The exceptions, while taking note of this almost certain erroneous assumption, undoubtedly went too far in the opposite direction, presuming an average of sixty to seventy-five men to each ship.[45] A more balanced study of the question, one based upon the most recent evidence regarding Scandinavian ships and naval practices suggests strongly that the truth, as is often the case, lies somewhere between the previously advanced extremes. A Norwegian invasion force of between eleven thousand and twelve thousand men borne on 250 vessels of diverse types—an average of between forty-four and forty-eight men to a ship—represents a tempered estimation based upon the available information.

Numerous efforts have been made to determine the number of men who landed with Duke William in southern England on 28-29 September 1066. Greater difficulty is encountered here than in treating with the question of the Norwegian force, for there are more marked variations in the sources regarding the number of ships in the Norman armada, the types of vessels involved, uncertainties complicated by the fact that, in contrast to the Norse monarch, William had to see to the transport of horses for his numerous mounted warriors. Those estimations that have been advanced, however, tend to demonstrate a consensus view that the Norman force probably numbered no more than seven thousand men and, in all likelihood, somewhat less.[46] This being the case, it only serves to underline the extent of the Norse assault upon England in the fall of 1066 and, at the same time,

40. Unger, *The Ship*, p. 91.
41. Ibid.
42. Foote and Wilson, *The Viking Achievement*, p. 281.
43. Ibid., p. 282.

44. *King Harald's Saga*, p. 138.

45. *Supra*, fn. 4. If, however, Brooks and Furneaux did err, their error was on the 'correct' side, tending as they clearly did to emphasize the great scale of King Harald's undertaking.

46. *Supra*, fn. 3. 'The Bayeux Tapestry shows clearly that the ships used by William the Conqueror were small ones. But they seem to have been of Scandinavian design and type and clinker-built'; Lewis, *The Northern Seas*, p. 450, fn. 268. So, also, Unger, who held that the ships built for the Norman duke's expedition were no bigger than vessels of the *karfi* class: *The Ship*, p. 134. As it has been estimated that William's force included between 3,000 and 4,000 knights, it would have been necessary to transport their mounts, a requirement that would have cut down markedly the space available for warriors.

the measure of the military victory of King Harold Godwinson at Stamford Bridge. When King Harald Sigurdson's great Viking armada glided up the Humber River and onto the tidal waters of the Ouse,[47] it bore a great army bent on the total subjugation of the Anglo-Saxon kingdom. Perhaps less than a month later the remnants of that mighty force, reputedly only enough men to man twenty-four ships, sailed back down the rivers to the North Sea and the long, mournful voyage, the dream of conquest wrenched from the hands of the now dead Norseman: it was Duke William of Normandy, the 'Conqueror,' who was the final beneficiary of the northern carnage.

47. In the fourteenth century, and probably in Roman times, the tidal Ouse was able to accommodate sea-going vessels as far as York. Today the tide reaches Naburn lock, some five miles below York, at which point it is approximately eighty feet wide. The construction of locks and other works in modern times has undoubtedly altered the natural state of the river. See R. A. Pelham, 'Fourteenth-Century England,' in *An Historical Geography of England before A.D. 1800*, ed. by H. C. Darby (Cambridge, 1969), p. 265; E. Tetlow, *The Enigma of Hastings* (New York, 1974), pp. 110, 112. Harald's fleet, which was said to have anchored at Riccall, some fifteen miles downstream from York, was probably in fact extended out for several miles along the river.

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The Pilgrimage of Lt. Alexander Pinkham, U.S.N. —A Mariner's Adventure Ashore

By Edouard A. Stackpole*

ON a bright morning during the summer of 1831, in the town of Dumfries, Scotland, the editor of the *Galloway Courier,* at his desk in the newspaper office, was handed a folded note, addressed to his personal attention.

He glanced at it hurriedly, then looked at his clerk. 'Well, John,' he remarked, 'is the man who gave you this still here?'

'Aye, Mr. McDiamid,' was the quick response. 'He's waiting. He's no one I know—looks like a seafaring man to me.'

The clerk departed to summon the visitor, while the editor resumed his reading of the missive. The handwriting, in a neat but small script, read as follows:

Dear Sir:

I would infringe upon your valuable time to request a favor which is of the greatest importance to me. I am an American—a Lieutenant in the United States Navy—and have crossed the Western Ocean and tramped these many miles through the British Isles all with but a single goal in mind; viz., to visit the homeland, nay, the birthplace, of two men whose works and exploits have been the greatest signal influence upon my life. These heroes of my youth were Robert Burns and John Paul Jones, both of whom were natives of this part of Scotland. Fully realizing that I am imposing on your time, I make bold to request that, through your offices, I may be able to secure an audience (howbeit of the shortest duration) with the venerable relict of Burns. This accomplished, I would seek your guidance in obtaining permission to visit the cottage where John Paul Jones was born. It was pointed out to me from the waters of the Solway, as I sailed thence a few days ago.

Trusting these requests strike a responsible chord in the breast of one who, I feel certain, fully appreciates the unusual circumstances of my visit, and sensible of the courtesy you have afforded me in reading this introduction to myself, I am sir,

Sincerely,
Lieut. Alexander Pinkham, U.S.N.

Although he read the note swiftly (and was to reread it a number of times after), the newspaperman was somewhat startled by the appearance of his visitor who, of sudden, filled the entire doorway. He later declared the stranger was the most extraordinary man he had ever met. In an account printed several weeks later in his newspaper, he wrote:

First of all, he was without question the most weather-beaten man I had ever seen. His age might be thirty or a little beyond. Blue eyes under a shaggy brow gleamed in a nut-brown face atop a neck which had the aspects of a young oak, with shoulders and chest easily the most prodigious I had ever beheld. Despite his six feet in height, his great bulk made him appear shorter. He was dressed as a traveller, and a knapsack of considerable dimensions dangled from one hand like a toy.

'May I sit down, sir?' inquired the stranger. His voice was so quiet and well modulated that the editor could not repress a visible start.

'Why, yes—of course.' The Scot covered his mixed reactions by quickly dragging a chair into position.

'Thank you, sir,' said the stranger, dropping the heavy knapsack next to the chair and then seating himself carefully, as if aware of the obvious strain his sturdy bulk placed on any chair.

'Your letter, Lieutenant,' began the editor, 'arouses my interest to a considerable degree—and I must admit a definite curiosity.'

The navy man smiled, and his stern features relaxed to an amazing degree. 'I trust you feel favorably inclined to my requests.' He appeared more comfortable now in the chair. 'From my experience in the world of letters, sir, I know that newspaper men are perhaps the best informed in the world. Further, they are quick at apprising a situation, no matter how unusual these may appear to be.'

* The author of this article is a collateral kinsman of the Pinkhams of Nantucket, and the story is carefully based on the diary of Lt. Alexander B. Pinkham, which is in his possession, as well as contemporary accounts of the incidents described. The statements of the editor of the *Dumfries and Galloway Courier*, as well as family records have also been utilized for the facts. A collection of letters which Lt. Alexander Pinkham and his brother, Lt. Reuben Pinkham, wrote from various parts of the world to their 'Honored Parents,' while serving in the U.S. Navy, have been important documents in developing the unusual events which formed the narrative of the remarkable 'Pilgrimage' of this extraordinary United States Naval officer.

Lt. Alexander B. Pinkham, U.S.N.
Painting by William Swain.

'Ah, thank you for your compliments to our craft.' The editor returned the smile. It was odd how the stranger could place him at ease. 'But, now, Lieutenant Pinkham, I can contain myself no longer. Pray, sir, why have you determined to come all this distance on such an errand?'

Lieutenant Pinkham nodded in acknowledgment of the query. He shifted his position to lean cautiously back in his chair and, having thoroughly tested it, relaxed and breathed a large sigh of relief.

'My reasons are simple enough,' he replied. 'I am a native of the island of Nantucket, which you know as a nursery for seamen as well as the greatest whaling port in the world. While quite young, my father, Capt. Andrew Pinkham, returned from a voyage to London, bringing a number of volumes including the poems of Bobby Burns. From the very first readings of his works I have been enthralled. My first voyage, at the age of thirteen was on the whaleship *Chili,* and the Burns' volume was in my sea-chest. Not only did I read them for myself but I read them to my shipmates. Upon my return home, after two and one half years, I entered the United States

The birthplace of John Paul Jones,
Arbigland, Scotland.

Navy—and my Burns has travelled with me around the world for nearly two decades. Now, on a six months' leave from the Navy I have resolved to tramp around the homeland of my two heroes—Bobby Burns and John Paul Jones.'

'A most unusual pilgrimage, sir,' remarked the editor. 'But, while you must be aware that while Bobby Burns is a native son of whom we are justly proud, John Paul Jones was for many years regarded as a pirate, I regret to say.'

Pinkham shook his head. 'Yes, I have heard such stories.' He drew a pipe from a cavernous shirt pocket, 'May I smoke, sir?' Receiving a quick assent he proceeded to fill the pipe bowl, lighted the tobacco, and then continued. 'I recall hearing Reuben Chase, who served under Jones in the *Bon Homme Richard,* tell of the man when he commanded the *Ranger*. I know that Jones deserves the title of being the Father of the United States Navy. He has given the service some of its proudest early moments. To visit his birthplace means much to me.'

'You have come a long way to fulfill your plans,' observed Editor McDiamid.

'Aye, and I must complete the journey.'

For a time neither man spoke and then the editor resumed the conversation. 'Of course, I will help you in your desire to speak with the Widow Burns. First, I will talk with her—she is reticent to speak with any but close friends; however, I will offer to bring you to her home myself.'

Lieutenant Pinkham got up from his chair with a lightness which belied his bulk. 'I appreciate your aid, sir.' Then, extending his hand, 'I thank you for your consid-

eration. I shall return in a few days for your report.'

When the two men parted, the young clerk watched the stranger as he made his way out the door and down the street, his knapsack once more in its place across the broad back as he strode in a determined manner along the way.

Lt. Alexander B. Pinkham was then in his thirty-eighth year. In November 1811 he returned from a whaling voyage in the ship *Chili,* of Nantucket, and reaching home had found that his father, Capt. Andrew Pinkham and his family, had joined a company of Nantucket men and their families who had sailed for Philadelphia, thence to cross the mountains to settle in the Ohio country. With the War of 1812 imminent, they did not wish to repeat the experience of their island as in the Revolution, when, trapped between the Royal Navy and the United States forces, they had seen their whaling fleet virtually destroyed.

The young whaleman followed his parents to their new home in Clermont County, Ohio. Here, learning of the fleet being assembled in Lake Erie by Commodore Oliver Perry, he made his way thence and joined the United States Navy—a service in which he had served for eighteen years. A first leave of absence had been granted by the Navy a year before, when he had been appointed commander of the brig *Clio,* a schoolship sailing from Nantucket as a seafaring adjunct to the Coffin School, a private institution founded on the Island by Admiral Sir Isaac Coffin, a retired British Navy man.

This was his second leave of absence from the United States Navy, and still a bachelor he had resolved to follow a long cherished idea—as expressed to his new friend, Editor McDiamid—a pilgrimage, indeed. Sailing from New York City on a Western Ocean packet to Liverpool; from thence to cross the Bristol channel to Ireland, so that he might explore the lakes of Killarney. Here, he sought out the vale where 'the stalwart mountains league to bulwark in, one little Eden from a world of sin.' This accomplished, he sailed from Cork to Wales.

In his diary he described the beginning of his next journey:

I put a change of linen into my knapsack, stuck my umbrella through the handles of it, and trudged along the road that lay by the wild sea shore for seventeen miles to Conway castle, at the mouth of a small river of that name. The castle was built by Edward 1st, and as this was the first of the ancient castles I had read about, I wandered about and within for three days, collecting all the scraps and prose relating to the subject. . . . There was the courtyard where resounded the clang of arms and the thumping of hooves; there glittered the burnished helmet and waved the nodding plume; there was the turret, the watch tower, the portcullis and draw bridge, the grand chapel and the dining hall.

After two more weeks in Wales, he embarked on a sloop for Scotland, *Jane and Margaret,* a coasting vessel bound for Dumfries. On the passage up the Solway, the site of the birthplace of John Paul Jones was pointed out to him. On board the vessel was a young doctor with whom he struck up an acquaintance, and it was this gentleman who, in response to the question, gave him the name of the editor of the *Galloway Courier* as a man who could direct him to the home of the Widow Burns in Dumfries.

'I believe that Mr. McDiamid knows the lady well,' said the young doctor, 'and I am sure he will be of assistance.'

This was the fortunate beginning of one of Lieutenant Pinkham's most unusual experiences, and the attainment of one of his chosen goals in his pilgrimage. But, it must not be forgotten that before he left the sloop that same day, he attempted to pay his passage and the mate of the vessel refused to accept it, declaring he could not take any money from one who was obviously a seafaring man. In his diary, the Nantucket man had written that during the passage from Wales he had slept each night on the main hatchway—'with my knapsack as my pillow.' Once ashore, he found a room and the next day visited Editor McDiamid, as has been recounted.

On his third day in Dumfries, Lieutenant Pinkham returned to the office of Editor McDiamid, to be greeted heartily, and announcing that the visit to the cot of the Widow Burns had been arranged.

'Her son has written to her of his arrival in London from India, having spent twenty years with the East India Company there,' Mr. McDiamid explained, 'and her twelve-year-old granddaughter is now with her. You may imagine that she is in good spirits.'

A short time later, the American navy man walked with his friend to the Burns cottage. They were immediately ushered into the room where the widow sat close to the window. The appearance of her huge visitor did not apparently concern her, but she listened carefully to McDiamid's introduction. Lieutenant Pinkham sat opposite her, and his description, as it originally appeared in his diary, follows:

I was surprised to find that she was not old or decrepid,

and I thought of her immediately as the Jean who Burns had immortalized. She was dressed in plain black bombazine that came up to her neck. She wore stays, exhibiting a full figure. From beneath her cap appeared several curls which seemed to be her natural hair. Having lost her upper front teeth, her lip projected a bit. She had a full face with indication of health. Her eyes were dark with black eyebrows.

Seated close at hand, Pinkham tried to recall all of her conversation, intending to commit it to memory, but, as he stated:

I was wrapted in admiration . . . only drawn off occasionally . . . enjoying the opportunity of conversing with the idol of the sweetest and most natural poet that ever sang in the English of Scots tongue. I shall not soon forget the sight of this elderly lady seated quietly, moving only when her little granddaughter came to stand beside her with her hand on her shoulder. The little girl's father had just returned from India, as had been explained to me, and her mother had died, in that foreign land, when she was two years old. She was now about twelve.

When the interview ended and he was escorted back to his friend, Mr. McDiamid, the American insisted they adjourn to the taproom for a glass or two of the inn's excellent ale. As they sat together, Pinkham began reciting verses from the Burns classic, *The Cotter's Saturday Night*, to the extent that his companion could not but express his complimentary remarks.

'You quote from Burns in such a way as to reveal your full understanding of the words,' observed McDiamid.

'Ah, but you must pardon me for my enthusiasm,' Pinkham replied. 'I know no other way to quote such lines.' He raised his glass. 'To me poetry is the essence of human thought in writing. I admire the poets the more since I have never been able to thus express myself.'

When the two parted, Lieutenant Pinkham announced his intention to visit the cot where John Paul Jones was born on that day, having secured directions. As they bade each other goodbye, McDiamid was again struck by the quiet assurance of the man in his plans for his 'pilgrimage.'

'With such a schedule, Lieutenant,' he observed, 'I am fearful the distances you must go will soon outstrip your time of leave.'

'All too true, friend,' replied the American. 'But, before I visit Glasgow and Edinburgh I must find the birthplace of Commodore Jones.'

'I have no doubt of this—and 'tis not far away. It will be a fine climax to your sojourn in this part of Scotland.'

Lieutenant Pinkham smiled, a curiously gentle smile on such a weather-beaten countenance. 'Aye,' he replied slowly, 'If ever a man's birthplace should be revered by an American Navy-man, that would be the cottage of John Paul Jones.'

At this point the two bade each other goodbye. But they were to meet once again before they separated for the last time.

A month passed, and the Editor McDiamid had actually concluded that Lieutenant Pinkham had left Scotland for London when, to his delight, the giant figure once again loomed in his office doorway.

Upon greeting his friend warmly, Editor McDiamid asked for news of the American's journey. Lieutenant Pinkham recounted his experiences, first in Glasgow, Greenock and the Western Highlands. From Stirling he had embarked in a steamer for Edinburgh, where he found much to admire. Resuming his pedestrian's role he threaded the vales of Tweed and Yarrow. While delighted with Melrose, he confessed a keen disappointment when he discovered the warring room of Cowden had disappeared, 'only to exist in ballad history.' A major regret came later when at Abbottsford he was unable to meet Sir Walter Scott, who was granting but few interviews at this time in his life.

On his way back to Dumfries, the American resolved to attempt an audience with a poet named James Hogg, known as the Ettrick Shepherd, but arrived at the man's home well after dusk. Having walked all day, the traveller was weary indeed, and rather than make himself known at this hour, he went into an orchard on the property to sleep. Stretching his big body on his cloak, with his knapsack again serving as his pillow, Pinkham was soon sound asleep. Soon after the sun was up the following morning he knocked at the door of the Shepherd.

James Hogg was surprised, especially when the American declared he must confess he had spent the night in his orchard, and wished the Shepherd to hear of it rather than to have to be so informed by some nearby resident who may have seen the stranger emerging from the trees at dawn. The welcome made up for previous disappointments as James Hogg insisted he stay for breakfast, and they spent the morning discussing poetry and the countryside.

Mr. McDiamid listened to the account with close attention, and asked a few questions on particular points. He was aware, however, of a certain restlessness in his visitor.

'Lieutenant Pinkham,' he remarked. 'There is some-

thing else in your mind, I feel, and it must be concerned with the climax to your journey—which you mentioned when you left here some weeks ago.'

'You are most perceptive, sir,' replied the American. 'Let me tell you of my most recent ramblings about your countryside. I have had a most delightful time of it wandering through the area made famous by your own Bobby, it has been truly inspirational. After concluding my tour of the Burns' country, and before leaving for Glasgow, I spent the morning on a walk to Kirkbean. It was a fine day, and it was my intent to find the birthplace of John Paul Jones, and to linger a while there.'

Mr. McDiamid smiled. 'And were my directions correct?'

'Aye. I had jotted them down—they were a direct course, sir.'

Here the American hesitated. His face had become suddenly grim. His companion sensed something had gone wrong, but he waited for the other to speak. He saw the frown on his friend's face had deepened and his silence continued.

'And what did you find?' He put the question slowly, almost deliberately.

'I found what I should have expected.' The reply was given almost as slowly.

'What do you mean?'

Lieutenant Pinkham sighed. 'I saw the old cot, where Jones was born, a roofless ruin.' He paused, then continued. 'Only the four walls remain, with the roof tumbled in—a desolate ruin.'

The Scot pursed his lips, and shook his head. 'It has not been occupied for years. It's virtually abandoned.'

'How could I have believed otherwise!' Lieutenant Pinkham's voice was quiet. 'To my countrymen, John Paul Jones was the actual father of our American navy. To your countrymen he was a renegade, a pirate, who sailed under the challenging colors of a swaggering new nation. I realize all too well, his raid on Whitehaven damned him forever to the folks in Britain.'

'I am aware of the sentiments here,' said Mr. McDiamid. 'His exploits in your naval service are little known. I have learned more from your accounts of him than I have ever found anywhere here.'

The American did not immediately respond. He was obviously lost in thought for several moments. His companion also made no comment, but as he regarded his friend he became aware of a swift change in him but was surprised at the sudden display of this mood.

'I have it!' exclaimed Pinkham. 'But again, I must have your aid.'

'By all means,' was the prompt reply.

'Here is what I propose,' continued the American. 'If you will write a letter to Mr. Craik, who you know, and who owns the property, I will outline my plans to him, seeking, of course, his permission.'

The two men then engaged in a long conversation, at the conclusion of which Mr. McDiamid got to his feet and shook his friend's hand warmly.

'I shall write to Mr. Craik without delay,' he said firmly.

Toward the end of that week, Lieutenant Pinkham again visited the spot, now, more than ever, a place to which he had established a firm purpose. As he inspected the cottage-birthplace of Jones he noted that the walls were still strong, although the roof was completely gone. Outside, the view commanded the sweep of the Solway, with the hills of Cumberland rising beyond. He was standing there, lost in thought, when a man walked across the field toward him.

'Are you the American Lieutenant Pinkham?'

'Yes—I am,' he replied, quite surprised.

'My master, Mr. Craik, wishes to see you.'

'Aye—I am a trespasser—I will willingly admit my guilt. Come, take me to him.' He got to his feet and made as if to immediately begin the journey. 'I will not keep him waiting and accept the penalty.'

'But he desires to welcome you to the manse, sir,' rejoined the servant, not a little astonished at the huge American's vigorous reaction. 'We got a letter from Mr. McDiamid two days ago, telling about your intended visit. The master was getting anxious, fearing we had missed you.' The servant gave him a wide grin. 'I don't think I'd ever miss spotting you, sir.'

Several hours later, the powerful figure of Lieutenant Pinkham, striding down a Dumfries street, caused many a pedestrian to stare. Maintaining a strong course, like a tall frigate with all sail set, he swept on his way until he reached the building which housed the *Dumfries and Galloway Courier*. He entered, and without waiting for the clerk to acknowledge more than the fact that the editor was in, the stalwart American burst into the inner sanctum and seated himself beside the editor.

'I have done it!' he exclaimed, repressed enthusiasm evidenced in his words, his features and his gesture—a mighty sweep of an arm, as if wielding a naval cutlass. 'The plan is completed and vouched for—signed and sealed, as it were!'

'What, for goodness sake, are you talking about?'

'I beg your pardon, sir,' the American regained his characteristic calm composure. 'Here is what has been in

my heart and mind these many weeks. When, after my first visit to the Jones cottage had resulted in so great a disappointment and I began my cruise into the Highlands, the plan first came to me. Why not seek the permission of Mr. Craik to restore the birthplace of my hero—make it habitable once more? Through your excellent letter, I have not only met Mr. Craik but, mind you, I have his express consent to have the cottage not only restored but made available to some fisherman's widow and family needing a home.'

The Scot looked at his companion some moments before answering. He saw that his American friend was apparently holding his enthusiasm in check like a raging fire and that his eye was flashing with an inner excitement he had never seen before.

'And this will be done, you say?'

In answer, the American took a leather pouch from his pocket and placed it on the editor's desk.

'Here are twenty sovereigns, sir, which I leave in your care, for payment to the carpenter repairing the roof of the cot. The season is far advanced but the work must not wait until spring. Mr. Craik is perfectly satisfied with the plan I left with him for additional payments in the course of the next year.'

'But, my dear Lieutenant,' ejaculated his friend, 'I know from our many exchanges of confidence that you can ill afford such an outlay of money.'

'True, sir, all too true,' acknowledged the American, 'I am far from affluent. But I have little to worry me on that score. My legs will still carry me through England and once in any seaport there, I can work my way home on any ship sailing. I made my first voyage a-whaling at the age of thirteen—nothing at sea since then has been too difficult for me.'

'Nothing at sea—and apparently on the land, either,' remarked the Scot, half to himself. He picked up the pouch of gold. 'And this you will have placed at the foot of your rainbow for others to find, no doubt.'

'Aye,' the huge form of the other settled itself contentedly in a chair which creaked ominously. 'I have found my ideal in a far country—I have had the honor of writing a footnote on a page in the life story of one of our immortal mariners.'

There was a sequel—or rather, two sequels to the story. The first appeared as a paragraph in the *Dumfries and Galloway Courier*, 30 July 1834, as follows:

> The cot in which John Paul Jones was born . . . has been repaired in the most tasteful manner. . . . The site of the cottage is in a glade in a thriving wood on the shores of the Solway, with a green in front, fancifully sailed, in and tastefully ornamented with evergreens and flowering shrubs. Inside and out it is a trim cottage, and as the walls are whitened annually with the finest lime, it is become a sort of landmark to nearly every sail that enters Solway. The widow of a fisherman . . . tenants it rent-free and will probably close her eyes under its honoured roof, and as this fact is generally known, almost every tar in passing the spot doffs his bonnet in token of gratitude and says: 'God bless the kind Lieutenant Pinkham.'

The second of these sequels is the story involving an exquisite miniature of John Paul Jones, placed in a locket of gold. It was painted by the beautiful Countess de Levendahl, at the French Court, at the time Jones visited Paris soon after his victory over the British frigate *Serapis*. After the death of Jones, the miniature came into the possession of his niece, Miss Janette Taylor. In the life of 'John Paul Jones,' by Alexander S. Mackenzie, as an illustration, is a steel engraving, evidently a copy of the famous miniature. Of this frontispiece, Mackenzie wrote:

> The miniature, coming into the hands of Miss Janette Taylor, niece of Jones, was presented by her to the late Commander Alexander Pinkham, U.S.N., as an acknowledgement for his generous service while on a pedestrian tour in Scotland, in rebuilding the cottage in which her uncle was born, and for kind and hospitable attention rendered to herself in this country. Shortly before the death of this estimable officer and truly amiable man, he placed the miniature in deposit at the New York Naval Lyceum. It is no doubt the most perfect likeness of Paul Jones that has yet been engraved, being strongly corroborated, as to expression, by his bust, as taken by the celebrated French sculptor Houdon for the Masonic Lodge of the Five Sisters in Paris, of which Jones was a member.

Today, the miniature is at the U.S. Naval Academy Museum at Annapolis. Painted on ivory, the likeness is enclosed between oval glasses, held in a narrow gold rim, and is backed by the monogram 'J.P.J.' in gold letters, surrounded by a braid of dark brown hair.

In the city of Washington, on a monument in the memory of John Paul Jones, is an inscription of a statement to the Marine Committee of the Congress by Jones in 1775. As one reads the words, the figure of Lt. Alexander B. Pinkham looms in the background. The inscription begins:

> It is by no means enough that an officer of the Navy should be a capable mariner. He must be that, of course, but also a

great deal more. He should be as well, a gentleman of liberal education, refined manner, punctilious courtesy, and the nicest sense of personal honor. . . .

In his personal papers, Lieutenant Pinkham wrote of his first visit to the birthplace of John Paul Jones:

Whilst there, amidst the ruins of the cot, it was sad to reflect on the fact that the only monument to this great man was here, crumbling away—the man over whose head the Stars and Stripes of our country ever proudly floated.

Lafayette has been lauded, and had wealth and fame, while the name of Paul Jones is now seldom mentioned. But here was a man who never retreated; never lowered the flag. . . .

And it is to be noted that Mr. Craik, the property owner, paid for the completion of the cottage, following the wishes of Lieutenant Pinkham and making it possible for the widow and family of an unfortunate fisherman lost at sea to live there for several years free of expense.

Today, as one walks up to the birthplace of John Paul Jones, one may see a brass plaque affixed to the wall of the cottage, in which it is stated that the restoration of the dwelling was accomplished in 1831 by Lt. Alexander Pinkham, U.S.N. This memorial was placed here by the United States Navy in 1944, when our naval craft were sailing in waters where Jones made a name for himself and for the young navy of a very young nation.

When the United States government was making plans to appoint a commander for the first United States Navy Exploring Expedition to the Pacific Ocean, the name of Lt. Alexander B. Pinkham was proposed. *The New York Mercantile Advertiser,* 4 October 1828, printed the following paragraph:

Lieut. Pinkham is well known to many of our nautical men as a first-rate seaman and navigator, active and enterprising, possessing a strong, robust constitution, with all the characteristics peculiar to his place of nativity—Nantucket. . . . Upon the whole it is considered that this would be a most judicious appointment.

But, as was typical in Congressional circles, considerable controversy took place in considering a commander for the expedition. More than a dozen years later, Lt. Charles Wilkes received the appointment. Lieutenant Pinkham was then appointed Commander and placed in charge of the Norfolk Navy Yard where he carried on his duties and where he died in 1844 at the age of fifty-two years.

Edouard A. Stackpole is a native of Nantucket, where he has lived most of his life, with the exception of a fourteen-year period when he served as the Curator of Mystic Seaport in Connecticut. At present he is the Director of the Peter Foulger Museum, of the Nantucket Historical Association. He has been twice appointed a Guggenheim Fellow, and has honorary degrees from Yale University and the University of Massachusetts. He is the author of twenty-two books, and has contributed to a number of historical journals. His historical studies include The Sea Hunters, Whales and Destiny *and* Those In Peril on The Sea. *In his book* The Voyage of The Huron and The Huntress *he drew attention to the humble sealers who were the actual discoverers of the Antarctic Continent in the early* 1820's. *The Pinkhams were a part of his family history. He lives in an old Nantucket house on Main Street with his wife, Florence T. Stackpole, and two of their five children are residents of the Island.*

Into the Ocean World

By William M. Fowler, Jr. and Jay R. Kaufman

AMERICA is a sea-minded nation. It was the harvest from the sea that first drew Europeans to this side of the Atlantic. The sea provided an avenue to the mother country and a barrier to our enemies. Upon the seas Yankee captains drove their vessels carrying produce and trade goods whose sale generated profits used to finance the economic and territorial growth of the republic. Today our dependence on the sea has shifted but not diminished. We depend upon sea lanes to bring us the raw materials needed to sustain our industries and ourselves while we look seaward for new sources of food and begin to speculate on ways to mine the ocean's bottom.

Given our intimacy with the sea it is unfortunate that in our academic institutions at both the secondary and college levels, we have in great part ignored the oceans. Nowhere is this more apparent than in interdisciplinary efforts. Where programs in urban studies, women's studies, Irish studies, Asian studies and any number of other 'studies' work to bring the various disciplines of the sciences, social sciences and humanities together, very little of a comparable nature exists in the marine area. This is regrettable for the issues we face—resource management, waste disposal, water supply, and development in the marine world—span the full breadth of academic disciplines and are not readily divisible along the neat intellectual lines that separate academic departments. Furthermore, these issues are of such complexity that few institutions have sufficient faculty expertise to launch a full interdisciplinary program.

Recognizing the need for an interdisciplinary and interinstitutional approach in 1968, under the sponsorship of the New Hampshire College and University Council, a pilot program was instituted to develop an interinstitutional marine science program. Ten colleges and universities entered into this consortium which continues to operate today, coordinated by the University of New Hampshire Sea Grant Program.

The success of the New Hampshire consortium provided a model for others to follow. In 1976 Arthur West, the former director of the consortium, suggested that the Greater Boston region with its wealth of marine interests and academic institutions was a natural location for an organization similar to the one he had been associated with in New Hampshire.

West's idea found a receptive audience at the MIT Sea Grant Program where the associate director for education coordination, E. R. Pariser, offered to help sponsor a meeting to which the various educational institutions in eastern Massachusetts might send representatives. Such a meeting was held on 1 December 1977. Over fifty representatives from twenty-seven institutions attended. As important as the number of institutions attending was the number of disciplines represented, ranging from oceanography to economics to literature and history. Discussion tended to focus on the need for a full interdisciplinary approach to marine issues and a marine *studies* (rather than marine *science*) approach. With so broad a scope it became apparent that no one institution, not even the largest, had sufficient faculty talent to offer a comprehensive program. From that realization emerged an organization currently operating as the Massachusetts Bay Marine Studies Consortium (MBMSC).

MBMSC is a nonprofit corporation chartered in the Commonwealth of Massachusetts.[1] It is funded by membership fees, user fees and grants. At the present time twenty colleges and two marine educational institutions comprise the membership. MBMSC's success owes much to its first major project, a course entitled 'Into the Ocean World' (IOW).

IOW was a direct answer to the need for an interinstitutional, interdisciplinary marine studies course. In October 1978, with the aid of a grant from the MIT Sea Grant Program, the Consortium engaged the services of a group of distinguished scholars representing various fields to present a syllabus for a rigorous interdisciplinary course. The team included: Richard Astro, dean of the College of Arts and Sciences, Northeastern University; David Kan, professor of marine science, Massachusetts Maritime Academy; Benjamin W. Labaree, director of The Williams College–Mystic Seaport Program in American Maritime Studies; Leah Smith, policy associate, Woods Hole Oceanographic Institute; Frank Sullivan, professor of biology, Salem State College and E. R. Pariser, associate director for education coordination, MIT Sea Grant. After several weeks of work the team presented a detailed plan for a course including lecture outlines, read-

1. The MBMSC, Inc. was chartered by the Commonwealth of Massachusetts on 2 March 1981.

ing assignments and a discussion of class logistics. In its broadest outline the course was to include sessions on Man and the Sea in Western Civilization to 1675; America and the Age of Sail 1675-1815; Triumph of Steam 1840-present; The Sea in Literature and the Arts; The Dynamic Ocean; Marine Ecosystems; Fisheries; Petroleum and Energy: Our Present Involvement; Navigation; Commerce and Shipping; The Future: International Policy; The Future: U.S. Policy; and The Future: Some Frontiers: Student Presentations. In addition to readings, several field trips were also recommended to sites such as Mystic Seaport, Massachusetts Maritime Academy, New Alchemy Institute and Woods Hole Oceanographic Institute. The team also suggested that the best location for the course was the New England Aquarium. Its central location in downtown Boston plus the fact that it was a 'neutral' nonuniversity location recommended its selection. The launch date was set for January 1980.

At first the expectation had been that those who designed the course would teach it, however conflicting commitments soon whittled the number of designers who would teach down to only two—Astro and Kan. Four new members of the teaching team were appointed: Susan Peterson, policy associate Woods Hole Oceanographic Institute; Arthur Gaines, Sea Grant Office Woods Hole Oceanographic Institute; William Fowler, history department, Northeastern University, and Jay Kaufman, education specialist, MIT Sea Grant Program. Kaufman was to serve as course coordinator with responsibility both for course logistics (ordering and distributing books, field trip arrangements, grades, etc.) and for working with the teaching team to guarantee bridges between the topics and disciplines in the curriculum.

Although the teaching team had an amazingly detailed outline from which to work it became apparent that the gap between design and implementation was considerable. In a series of meetings numerous revisions were made and, perhaps most importantly, a central theme was selected. In an introductory statement to the students the course was set forth as:

> a comprehensive interdisciplinary introduction to the oceans. The sea's complexity and far-reaching consequences of our interactions with it demand an awareness of the many facets of marine study. The teaching team is composed of experts in the sciences, social sciences, humanities and arts—each with an interest in marine issues and each with a commitment to bridging the gaps between disciplines. The course themes will be as broad as the oceans, but throughout the course, attention will focus on Boston Harbor—a first step into the ocean world for those of us in this area.

The course objectives were outlined carefully:

1. To help students understand the vital and central role that the oceans play in our lives;
2. To introduce the terminology, methodology and literature of the disciplines involved in marine studies;
3. To show students the complex nature of aquatic studies and the interrelatedness of the various perspectives;
4. To sensitize students to the role that our many ties to water have played in our cultural and historical development;
5. To enable students to take an informed responsible position on controversial issues relating to the marine environment in general, and Boston Harbor in particular;
6. To provide a sound base and incentives for further study.

The inaugural class had thirty-four students. They represented eighteen colleges and universities and were, without design, evenly distributed between male and female students. Of the thirty-four, nineteen were science majors. The course was to meet once a week for a 2½-hour period.

Selecting Boston Harbor as the focus for the course proved to be of critical importance. In addition to the obvious reason of proximity this theme was chosen, in part, because 1980 was Boston's 350th anniversary and the principal celebratory event was a Tall Ships Parade scheduled for June which already in January was attracting a good deal of publicity. Also 1980 had been designated as the Year of the Coast, and with that a good deal of attention was being focused on the harbor. To carry the theme forward the team agreed to use the harbor where possible to illustrate the grander themes to be introduced.

A second commitment made by the team was to move the students out of the classroom and actually into the marine environment. If indeed we were to deal with critical marine-related issues, then the students had to go to the source of those issues. Two strategems were employed to accomplish this. First, members of the class were required to complete a project. The topic for each of the projects was left vague in order to accommodate the varied interests of the students, however, it had to relate to Boston Harbor. Students were told the general areas of expertise the faculty represented and were asked to consult with the appropriate person in order to define their topic. This process resulted in a variety of projects ranging from a paper comparing Boston Harbor and Singapore, and a history of the Boston Fish Pier, to an examination of the role of thermal variance in the harbor's pollution, and a slide presentation on marine art and Boston Harbor.

Toward the end of the course students made brief presentations about their projects in class. Generally the

quality of the work was high. In addition, in almost every case students had to go beyond traditional library or laboratory sources and actually go to the scene of their work. This often brought students in direct contact with people in the field with reciprocal beneficial results.

In addition to their class and project work, students were required to participate in a two-day, overnight, excursion on Boston Harbor. The first day was spent traveling on a chartered boat around the harbor. Every effort was made to visit those parts of the harbor not ordinarily seen from the shoreside and lively discussions followed concerning both the history of the harbor as well as contemporary political issues concerning its use. In the course of the day several stops were made so that the scientists in the teaching team could take samples of the water as well as bottom sediments. This enabled students to participate directly in a scientific endeavor, and indeed, some used the opportunity to gather information for their class project.

At the end of the harbor tour the students and faculty went ashore at the Thompson Island Educational Center. After dinner on the island everyone gathered in the dormitory to discuss the day's activities and present observations on the condition of the harbor. The next morning was spent in touring the island and examining the various ecological processes at work on a relatively undeveloped harbor island.

Not surprisingly the field trip proved to be one of the most popular segments of the course. In addition to exposing students firsthand to the marine environment it also had the very important benefit of introducing the students to one another. Coming from various schools they were not acquainted; the close conditions of the field trip helped produce a closeness among the students that would be difficult to match on any campus.

By every informal method of evaluation things seemed to have gone well. However, since both the Consortium and the course were somewhat experimental it had been decided at the very beginning that a formal and professional evaluation would be conducted. A consultant from Leslie College was contracted to conduct the evaluation. The results were even better than anticipated. In a questionnaire distributed to the students after the course everyone either 'agreed' or 'strongly agreed' to the following statements:

I was exposed to conflicts and challenges in the contemporary marine environment.

I feel better prepared to address marine policy questions.

I would recommend this course to my friends.

Negative comments also came through on the evaluation. The most important of these had to do with the need for greater integration of material on the part of the teaching team and, on a more mundane level, the inadequacies of the meeting place.

The latter problem was easily solved by the generous offer of the MIT Sea Grant Program to use their facilities conveniently located in Cambridge. The former issue, integration of material, was more difficult.

Aside from the inherent intellectual difficulties present there was also a simple personal one. Before our involvement with IOW many of us were unacquainted with one another and none of us had ever taught together before. Since we planned to offer the course again in 1981 the members of the team met several times to amend the syllabus and make necessary changes. At the same time the team itself changed slightly. Richard Astro and David Kan were unable to continue and the teaching team was left with four members, all experienced with the course and better able to coordinate and work together.

In January 1981 IOW II got under way. Although the syllabus was revised somewhat and the meeting place changed, the course followed closely in the wake of its predecessor. From the beginning, however, one thing did become evident—the team was working better. Having been through the process once we were now able to anticipate one another and thereby make references to each other's areas. Since we all made an attempt to attend every class there was ample opportunity for discussion among the team as well as participation from the students. Enthusiasm among the students continued to run high.

At the course's third offering another change in the teaching team's makeup was required. Peterson could no longer participate and was replaced by Gary Clayton, assistant director scientific staff, Massachusetts Coastal Zone Management Office. Clayton's addition reinforced the course's connection to the 'real world' issues and helped to bring it closer to the Boston Harbor environment. The following year another change was made when Arthur Gaines was replaced by Les Kaufman, curator of education at the New England Aquarium. Now in its fifth generation, the course will be offered in 1984.

Our experience with 'Into the Ocean World' provides several lessons. The first, and perhaps most important, is that marine-related topics provide a marvelous opportunity for interdisciplinary studies. Issues in the marine world are not subject to examination, let alone solution, by the application of a single discipline. There has never been a time, in any of the classes and no matter what the

topic, where a discipline has been silent. Aside from the information gained by the individual students it also seems clear that they have each gained a new regard for the knowledge and methodology of the several disciplines.

It is a mistake, however, to assume that the integration of material is solely an intellectual effort. What truly distinguishes IOW from other interdisciplinary efforts is the high degree of personal commitment it demands from both faculty and students.

A second key element in understanding the success of this course is that it combines the intellectual with the experiential. A discussion of harbor pollution is wonderfully amplified by bringing up a bottom grab laden with muck and ooze (a nonscientific term used by the historian in the teaching team) that positively reeks. The deck of a boat lying just inside Boston Light provides an exciting setting for the discussion of the historical growth of the harbor.

Building on IOW's success, the Consortium now offers other courses, including 'A History of Seafaring Based on Maritime Archaeology,' 'Water, Water,' and a summer adult education course modeled on IOW.

In the meantime as other efforts of the Consortium go forward, IOW continues to be offered. Although the topics continue to evolve and change we have held true to the course first charted in 1980 providing our students with a first step into the ocean world.[2]

2. Readers wishing to know more about the operational details of MBMSC or IOW are invited to contact:
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Otter Trawling Comes to America: The Bay State Fishing Company, 1905-1938

By Andrew W. German

OTTER trawling, a method of dragging a net bag across the sea bottom to catch fish, is a relative newcomer to North America. But in the seventy-eight years since its introduction it has come to dominate the bottom fisheries. The story of its establishment is a tale of social, scientific, and economic controversy which focuses to a large degree on the firm responsible for its appearance in these waters, the Bay State Fishing Company.

Trawling has a long history in Europe. The concept behind the otter trawl dates back to the Roman Empire (the fishnet itself is a prehistoric device). The net bag used by the Romans to dredge for oysters was the inspiration for the British 'wondrychoun,' a fairly small net bag used to drag for fish in estuaries. Introduced about A.D. 1370, the wondrychoun was opposed for its brutal efficiency at sweeping fish and shellfish out of rivers. The alongshore use of this device now called a trawl—probably from the Middle English *trailen* or *trail,* to drag or draw along—was further disputed in the seventeenth century. The method was also known on the continent, being employed by Dutch and French fishermen, as depicted in Diderot's *Encyclopedia.*[1]

Offshore, beam trawls—net bags held open with stout elm beams—were introduced simultaneously by fishermen of Barking, near the mouth of the Thames, and of Brixham on England's southwest coast. The Barking trawl was an offshoot of the wondrychoun and the Brixham trawl was based on Dutch nets.[2]

After the Napoleonic wars the focus of the United Kingdom's bottom fisheries shifted toward the North Sea. By the 1830's large fleets of sailing beam trawlers began to operate from England's east coast ports, such as Hull and Grimsby. Steam carriers were introduced as early as 1862 to collect the fish caught by the trawler fleets and rush them to market. In 1877 a tug was used to drag a trawl, and proved a great success. The first true steam trawler, *Zodiac* of 1881, launched a revolutionary shift to steam power. The nearly 1,300 sailing trawlers of Hull and Grimsby dwindled to a mere 34 between 1887 and 1903 under the competition of steam trawlers. These ports claimed 960 steam trawlers by 1909. The British trawlers soon began to prowl the seas, first venturing to Iceland in 1891, the Bay of Biscay in 1893, the Faroe Islands in 1898, and the Murmansk grounds in 1904.[3]

Methods were improved about 1894 with the introduction of the otter trawl. Named for an Irish device for catching lake trout and pike, the otter trawl was kept open by two rectangular otter boards or doors, one at either side of the net mouth, that were forced outward by the pressure of the water as the trawl was towed. Much easier to handle than a beam trawl with its forty-eight-foot wooden beam, the otter trawl was in general use by 1900.[4]

American fishermen have generally lagged a bit behind their northern European counterparts in fishing technology. For example, the long line method of fishing, in use by the Dutch from the 1500's, was not accepted by Americans until about 1840. And so it was with the beam trawl and otter trawl.

Several attempts to introduce beam trawling to the United States in the nineteenth century are recorded. Captain MacKinnon of the Royal Navy, traveling in America in 1850, was surprised to find no beam trawls in use, and attempted to encourage experiments with them. Though ridiculed by American fishermen, he did demonstrate the use of a small beam trawl at Newport, Rhode Island, with Elnathan Smith, who had imported it ten years earlier. Despite its productivity, MacKinnon reported the Newport fishermen rejected the beam trawl as 'a very *mean* way of catching fish!'[5]

In 1865 Boston Irish fishermen built the schooner *Sylph* to experiment with beam trawling but gave it up after a short while.[6]

1. John Dyson, *Business in Great Waters* (London: Angus & Robertson, 1977), p. 37.
2. Ibid., p. 73.
3. Ibid., pp. 73-77, 245-48, 254.
4. Ibid., p. 260.
5. Captain MacKinnon, *Atlantic and Transatlantic* (New York: Harper & Brothers, 1852), pp. 168-69.
6. Howard I. Chapelle, *The American Fishing Schooners, 1825-1935* (New York: W. W. Norton, 1973), p. 107.

The developing fisheries of the Pacific coast became the new focus of improved fishing technology. Hook-and-line and seine methods were in use into the 1870's, centered at San Francisco. In 1876 some fishermen, perhaps of Italian extraction, had a 'drag seine' or 'bag seine' made, and quickly demonstrated its efficacy. This was essentially a beam trawl without a beam and with extended net wings at the sides of the conical 'bunt.' In common use on the Mediterranean, this net could be set off the beach (as it was in the twentieth-century striped bass fishery of Long Island) or from watercraft. When operated from a boat the net was called a 'paranzella' (the Italian diminutive for fishing boat).

By the 1880's the steam tug *U.S. Grant* was towing a paranzella off Point Reyes and the Farallone Islands for flounder. She was rigged with long outrigger booms to accommodate the width of the net's mouth. Italian fishermen of San Francisco and Santa Cruz went 'pair trawling' with paranzellas in deep water also, beginning in the 1870's. These fishermen used two twenty-five-foot lateen-rigged feluccas to tow each net. The paranzella was condemned by opponents for supplying enough fish to glut the market.[7]

The beam trawl also made a successful appearance on the west coast. In 1884 the former Grimsby fisherman John Exon began beam trawling at Portland, Oregon, but this enterprise ended when Exon and his vessel were lost in 1886.[8]

The strongest American proponent of beam trawling in the nineteenth century was Capt. Joseph Collins, born in 1839 at Islesboro, Maine. A fisherman, a member of the U.S. Fish Commission, and finally Massachusetts Commissioner of Fisheries and Game, Collins was perhaps the greatest voice for American fishery reform. Several of his published recommendations were based upon European technology, including his 'Suggestions for the Employment of Improved Types of Vessels in the Market Fisheries, With Notes on the British Fishing Steamers,' published by the U.S. Fish Commission in its 1888 *Bulletin*.

Apparently with the encouragement of Captain Collins, Provincetown fishermen began experimenting with beam trawls about 1887. They first used small boats, then schooner-boats, and finally settled on sloop-boats to drag their trawls. They sought flounder on the smooth bottom of Cape Cod Bay, fishing between October and February. In 1898, twenty-seven beam trawls were in use at Provincetown, and by 1904, the year of Collins's death, sixty-seven were being dragged in the Bay. These trawls were about seventy-five feet in length, with beams roughly twenty-five feet long.[9]

Capt. Alfred Bradford, an English native in command of the Boston schooner *Mary F. Chisholm*, experimented with a beam trawl in the spring of 1891. Based on his success, he and Ben Low of Gloucester had a British style, ketch-rigged beam trawler built by A. D. Story to plans obtained from the U.S. Fish Commission. Named *Resolute*, she made four trips between November 1891 and March 1892, fishing in up to ninety fathoms of water. Although she landed some fair catches, and Bradford felt he was perfecting the technique, Low lost his resolve and *Resolute* was rerigged for hook-and-line fishing. Thus, except for California's progressive paranzella fishermen and Provincetown's beam trawlers, American fishermen rejected attempts to introduce beam trawling.[10]

In 1903 the persistent Captain Collins convinced a Wellfleet oysterman to experiment with an otter trawl. The boat was frozen in during the ensuing winter so the net was not tested again until the fall of 1904. While even the forward-thinking Provincetown beam trawlers were skeptical of it, the otter trawl proved to be more productive than a beam trawl. Capt. Solomon Jacobs, Gloucester's mackerel king, also learned about the otter trawl's productivity that winter, using a gasoline-powered boat on Ipswich Bay.[11]

Already talks must have gotten under way in Boston to discuss the next logical step—full-scale steam trawling. The success of the Hull and Grimsby fisheries could not have been lost on the aggressive Boston wholesalers who envisioned Boston surpassing Grimsby as the world's busiest fishing port. In the twenty years since settling on T Wharf, Boston's merchants had reached parity with Gloucester's dealers in volume of fish landed.

7. J. W. Collins, 'Fisheries of the Pacific Coast,' *Report of the Commissioner of Fish and Fisheries for 1888* (Washington, D.C.: Government Printing Office, 1892), pp. 64-65, 131-32; G. Brown Goode, ed., *The Fisheries and Fishery Industries of the U.S.*, Section II (Washington, D.C.: Government Printing Office, 1887), pp. 609-12.

8. *Report of the Commissioner of Fish and Fisheries for 1893* (Washington, D.C.: Government Printing Office, 1894), p. 215.

9. *Report of the Commissioner of Fish and Fisheries for the Fiscal Year 1892* (Washington, D.C.: Government Printing Office, 1893), pp. clxxxi-clxxxii; 'Fisheries of the New England States,' *Report of the U.S. Bureau of Fisheries for the Fiscal Year 1904* (Washington, D.C.: Government Printing Office, 1905), p. 291; 'Drudgin',' *New England Magazine* 41 (1910): 665-71; *Report of the Commissioner on Fish and Game for the Year Ending December 31, 1904* (Massachusetts Public Document No. 25), pp. 31-32.

10. 'Attempt to Establish a Beam Trawl Fishery,' *Report of the Commissioner of Fish and Fisheries for the Fiscal Year 1892* (Washington, D.C.: Government Printing Office, 1893), pp. clxxxi-clxxxii.

11. *Report of the Commissioner on Fish and Game for the Year Ending December 31, 1904.* (Massachusetts Public Document No. 25), pp. 32-34; *Fishing Gazette*, 20 January 1906.

Boston's annual landings had risen from 18.5 million pounds in 1887 to 80 million pounds in 1903. Some of these expansive dealers had already reached out to help finance and control the red snapper fishery of the Gulf and the cod and halibut fisheries of the Pacific Northwest.

In fact, the New England Fish Company, of which some Boston dealers were officers, had begun to build steamers on the British model for the Pacific halibut fishery in 1897. Steam had first been applied to American fishing in the menhaden and oyster fisheries about 1871. Steam power had been tried in the mackerel fishery with the Kennebunkport steamer *Novelty* in 1885 and Solomon Jacobs's *Alice M. Jacobs* in 1902. The use of steam power in San Francisco's paranzella fishery increased after 1890, but New England fishermen had shown little interest, except for some unsuccessful experiments with menhaden steamers in the arduous winter haddock fishery. In the spring of 1905, Joseph Wharton (founder of the business school) was outfitting his namesake menhaden steamer to fish with a beamless trawl off New Jersey, but in Boston there was a man with something bigger on his mind.[12]

Reportedly the greatest credit for inaugurating otter trawling in New England should be given to Adm. Francis Tiffany Bowles, president of the Quincy Fore River Shipbuilding Company. Upon graduating from the U.S. Naval Academy in 1879, he had been aware of the sad state of the U.S. Navy and requested an appointment to the Royal Naval College at Greenwich, England. When he returned to the United States in 1882 he was well versed in the latest iron and steel construction techniques and immediately participated in the design and construction of the 'new' American steel Navy of the 1880's. He later supervised construction at several Navy yards and with the rank of Rear Admiral served as Chief Constructor of the Navy from 1901 to 1903.

Resigning his commission in 1903, he became president of the Quincy Fore River Shipbuilding Company. Despite his naval training, he was a strong believer in a prosperous merchant marine, and directed the Fore River Company to a combination of naval and merchant vessel construction. To modernize the fishing fleet (and no doubt engender work for his company) Bowles apparently broached the idea of constructing a North Sea type of steel otter trawler to Boston fish dealers and bankers in 1904.[13]

Two of the principal fish dealers interested in the project were John R. Neal and L. B. Goodspeed. Born at Wellfleet in 1848, John R. Neal spent some time at sea before settling in Boston as a fish dealer in 1878. He and his brother Frank ran John R. Neal & Company, wholesale dealers in fresh and frozen fish. After 1888 they specialized in producing finnan haddie (smoked haddock), winning awards for it at the 1893 Columbian Exposition and in Norway in 1898.[14]

L. B. Goodspeed began his career as bookkeeper for Arnold & Winsor on T Wharf. When he joined his older brothers in 1894 their firm was renamed L. B. Goodspeed & Company. They had extensive dealings with New York, Philadelphia, and Baltimore. Goodspeed was treasurer of the T Wharf Association, and was active in several other companies.[15]

To ensure the financial underpinnings of their venture Bowles and the fish dealers enlisted a solid rank of old Boston families and money. To seal this connection the three principal officers were young Harvard-educated lawyers from the right families. Laurence A. Ford, an 1898 graduate of Harvard Law School, was selected as president of the proposed firm. The treasurer, Henry Endicott, Jr., had graduated from Harvard in 1897, and the clerk, Henry W. Palmer, was only four years out of Harvard in 1905.

A substantial portion of the financial base of Boston was also behind the company, directly or indirectly. Kidder, Peabody & Company, bankers of Devonshire Street, were investors, as was T. Jefferson Coolidge. T. Jefferson Coolidge, Jr., was president of the Bay State Trust Company. His father was director of the Bay State Trust Company, and also the New England Trust Company, whose chairman was Henry Endicott, Sr. Alongside this staunch financial bulwark stood the Fore River Shipbuilding Company, and enough fish money to weather much adversity.[16]

So the Bay State Fishing Company was born. It was chartered in Massachusetts on 5 June 1905 with capital-

12. *Nautical Gazette,* 28 March 1901; Howard I. Chapelle, *National Watercraft Collection,* 2nd ed. (Washington, D.C.: Smithsonian Institution Press, 1976), pp. 239-43; *Nautical Gazette,* 6 April 1905, p. 276; *Fishing Gazette,* 2 December 1905, p. 981; 20 January 1906.

13. *Dictionary of American Biography;* Ralph F. Symonds and Henry O. Trowbridge, 'The Development of Beam Trawling in the North Atlantic,' *Transactions of the Society of Naval Architects and Marine Engineers* 55 (1947): 371.

14. *Fishing Gazette,* 1 May 1915; *Boston Transcript,* 21 August 1922.

15. *Fishing Gazette,* 1 May 1915.

16. Ibid., 17 June 1905, p. 476; 1 July 1905, p. 518; Boston Business Directories.

ization of $100,000; roughly twice the cost of a steam trawler ready to fish.[17]

When the company was announced, dory fishermen and schooner owners reacted. Hook-and-line fishermen, who had been anticipating the otter trawl challenge for some years, were outspoken. 'It is only a deal to control the market,' claimed Joseph Rogers, business agent of the Boston branch of the Fishermen's Union of America. John R. Neal, who would act as agent for the company's trawler, replied, 'It is no trust—only a measure of improving the general market and securing a more steady supply of fish.' The *Fishing Gazette,* national newsletter for fish dealers, agreed. Taking note of the formidable and respectable underpinnings of the company, the *Gazette* noted, 'The only question that we think suggests itself for prior consideration is as to the reliability financially and otherwise of "the men behind." On this point we have satisfied our utmost scruples . . . the enterprise is not a trust, it is not a syndicate in the ordinary acceptation of the term.' But the Fishermen's Union vowed to oppose it.[18]

Not surprisingly, Bowles got the contract to build the company's first trawler. The Fore River Shipbuilding Company had been established as the small Fore River

Spray (126.6 x 22 x 12.9) the first American otter trawler.
Nautical Gazette photo.

Engine Company at East Braintree in 1884. After winning contracts for two destroyers in 1899, the company built a seventy-five-acre yard at Quincy Point in 1900. It was considered the most modern and complete yard in the country at the time, winning contracts for two 15,000-ton battleships in 1901.[19]

17. *Fishing Gazette,* 1 July 1905, p. 518.

18. *Gloucester Daily Times,* 29 June 1905; *Fishing Gazette,* 15 July 1905, p. 551.

19. *Nautical Gazette,* 6 June 1901.

The 350-ton steam trawler was small by comparison to Fore River's usual work. Slightly bigger than a large fishing schooner, she was 139 feet overall, with a 22-foot beam and 12½-foot depth of hold. She was identical to the latest British trawlers, with a forecastle forward, fish hold beneath the working deck, a second-deck pilothouse above the charthouse, and galley, and officers' and engineroom crew quarters aft. The engine was a 900-indicated-horsepower triple-expansion engine with scotch (firetube) boiler. To light her quarters and her deck for night work she was equipped with acetylene gas lamps. Laid down in July, the steel vessel was launched five months later and christened *Spray*. She cost $60,000 to build, about three times the cost of a first-class fishing schooner.[20]

To command this pioneering vessel the company selected the popular and skilled Boston skipper Henry Dexter Malone. Born at Woods Harbor, Nova Scotia, in 1865, Malone had begun his apprenticeship as a fisherman at about age eleven. He probably arrived in Massachusetts in the 1880's, and had risen to command schooners in the Boston fleet before 1900. He had had the schooner *Manhassett* built in 1902. Two years later he had lost his right hand in a freak accident when a signal pistol misfired as he was recalling his dorymen. An extremely capable skipper, but one whose ability aboard a schooner was somewhat limited by his injury, Dexter Malone was a prime candidate to command the new otter trawler. To prepare him for the task, the company sent him to Grimsby to observe British techniques for a couple of months. He was then ready when *Spray* was fitted out for her maiden voyage.[21]

Spray's crew of fourteen included British fishing Captain Hool, mate Oliver Thomas, and Grimsby fisherman Jack Robinson to supervise operations. *Spray* left Boston and set, or 'shot,' her trawl for the first time off Chatham on 19 December 1905. Upon hauling back, a good catch of mixed fish was dumped on deck to the cheers of the fishermen. But the second set pointed out the hazards of otter trawling on unknown ground. *Spray* was brought up short when the trawl snagged a wreck; and the trawl itself came up in shreds, the first of uncounted 'rimracked' otter trawls in the New England fisheries.[22]

20. Ibid., 1 February 1906, pp. 73-74.

21. Henry D. Malone, Record of Death, Massachusetts Registry of Vital Records and Statistics, Boston, Massachusetts; *Nautical Gazette,* 5 May 1904, p. 256; Boston Business Directories, 1914-1923; *Fishermen of the Atlantic, 1914* (Boston: Master Mariners' Association, 1914), list of vessels; *Fishing Gazette,* 25 November 1905, p. 961.

22. *Nautical Gazette,* 1 February 1906, pp. 74-75.

Henry Dexter Malone, the Bay State Fishing Company's first captain.

Spray tended to roll in heavy seas, and she blew a boiler flange on that first trip, but her financiers were optimistic for her success. Line fishermen were resentful and pointed to the poor condition of her catch to discredit her.[23]

When she landed her fourth fare, 78,200 pounds of good quality fish taken during a week on Georges Bank, Captain Malone boasted of her potential. But by May he was losing faith. It was hard to find good ground, and the expense of steaming for two or three weeks ate up most of the return on the fish.[24]

Malone resigned in June, claiming, 'Only a slight advantage is gained by steam power. A schooner of the fast sailing type which is now characteristic of the fishing fleet can beat the *Spray* in from South Channel by four hours, with a fair wind. A schooner and its dories can cover more ground than can be covered by the steam trawler . . . I am convinced that month for month a schooner can bring in more fish than a steam trawler.'

23. Ibid., 1 February 1906, p. 75; 4 January 1906, p. 16.

24. *Nautical Gazette,* 8 February 1906, p. 106; 31 May 1906, p. 402.

On the other hand, he noted, 'The net can be set and hauled when a schooner's captain would not allow his dorymen to set out from the vessel on account of the danger of losing their lives. Steam trawling is a more humane method of fishing, and from that point of view deserves to be a successor to the dory style of trawling. . . . There is a possibility that if another man can bring better results on the *Spray* than I have, that another trawler may be built. I have done the best I could, and find that there is more money for me in schooner fishing than in steam trawling.'[25]

His words must have cheered up the schooner fishermen. Malone went back to *Manhassett,* served as treasurer of the Boston Fishing Masters' Association, and joined his brother Elias in a ship chandlery on Atlantic Avenue. By 1914 he was managing three schooners, including *Manhassett*. He had her fitted that year with the first successful diesel engine to be put in a New England fishing schooner, a 120-horsepower Nelseco engine that would power her at nine knots. Her success heralded the rise of efficient auxiliary fishing schooners, and eventually diesel otter trawlers as well. Malone himself turned away from the sea, withdrawing from the chandlery after 1919 and opening a laundry in Dorchester. He died in 1923 at age fifty-eight.[26]

The Bay State Fishing Company indeed found a capable successor to Dexter Malone. Michael Green took command of *Spray* and methodically sampled the grounds to find where she could fish profitably. Her crew spent a good deal of time mending twine, but became proficient at shooting and hauling back the trawl.[27]

25. *Fishing Gazette,* 30 June 1906, p. 615.

26. *Fishermen of the Atlantic, 1914,* list of vessels; Boston Business Directories, 1914-1923; *Boston Transcript,* 10 October 1923, obituary.

27. The process was (and is yet) complex. To begin, the trawl lies on deck with its doors hanging at the arched gallows fore and aft. The cables or warps lead from the steam winch forward of the deckhouse through fairleads on deck and over blocks on the gallows to their attachments on the doors. In order to shoot the trawl, the vessel is stopped dead in the water with the trawl on the windward side. First the wings, just aft of the doors, are put over the rail, while the doors remain at the gallows. Then the cod end is put over, followed by the rest of the trawl, until it streams away from the vessel as the ground rope at the mouth is put over. With the trawl ready to lower, the captain takes his place on the bridge, the mate and one man tend the winch, two fishermen stand by the gallows, and another is ready amidships. The two warps are slacked away until the trawl, drawn down by the 750-pound doors, drops below the propellor. With two blasts of the whistle, the vessel begins to steam ahead while the mate watches the shackles or marks on the two warps to make sure they are running out equally. When he has run out scope totaling three times the water depth, he puts on the winch brakes to stop the warps. Simultaneously, the messenger, a line with a large hook on the end, is passed over the after warp and brought forward by the midshipman or trimmer to engage the forward warp. Winching in on the messenger

Ripple (114.3 x 22.5 x 11.6), second of the five whaleback bow trawlers, was launched at Quincy late in 1910. Nathaniel Stebbins photographed her in Boston Harbor, 3 January 1917.
Courtesy of Society for the Preservation of New England Antiquities.

Even as Captain Green was perfecting his technique, John R. Neal's denial of monopolistic aims was proving to be hollow. The National Fisheries Company was chartered in Maine in the fall of 1906 as a combination or holding company composed of fourteen wholesalers who hoped to control the Massachusetts fish business. Capitalized for $5 million, the firm intended to promote otter trawling at the expense of dory fishing, to set up curing plants in East and South Boston to lure away the heart of Gloucester's salt cod industry, and to replace the auction form of sale from vessels with fixed prices based on supply and demand. But apparently a combination of disagreement between dealers, overly grandiose plans, and industry opposition killed the National Fisheries Company.[28]

Only two years later the Boston dealers agreed with fishermen to go in the opposite direction, establishing the New England Fish Exchange to oversee a formal auction form of delivery from fishing vessels. The Exchange operated on free market principles, and provided redress for grievances by fishermen or dealers. In reality, however, the tendency continued toward consolidation. For example, John F. O'Hara, who established the Bay Fish Company in 1908, had acquired seven other wholesale

brings the two warps together aft at the quarter where they are fastened in a snatch block called the towing block.

On the bottom, the trawl is about 110 feet across (under way it sags to 90 feet across) and 4 feet high at the mouth, tapering back 130 feet to the cod end. As the vessel steams at about 3 knots for perhaps an hour and a half, the trawl sweeps a path 90 feet wide and 5 miles long.

To haul back, the vessel turns toward the towing side as the towing block is released and the winch takes up the warps. Once the doors reach the gallows, quarter ropes are used to gather and haul the ground rope and mouth aboard. Then the crew hauls in the trawl by hand until the cod end is reached. Sometimes it rides high, ballooned up by the inflated swim bladders of the fish within. A tackle from the foremast is used to hoist the cod end above the deck, and the cod end knot is released to dump the catch in the checkers or pens on deck. Unless they have a second trawl ready to fish on the other side, the crew quickly repairs any damage to the twine and shoots the trawl again. Afterwards the fish are sorted, the marketable ones being gutted and stowed below in ice. The crew is divided in half and works six-hour watches round the clock. See Symonds and Trowbridge, 'Development of Beam Trawling,' pp. 363-65.

28. *Fishing Gazette*, 17 November 1906, p. 1097. When Gorton-Pew was organized that same year as a combination of four Gloucester salt cod firms, there was also talk of a fishing trust.

fish concerns by 1914. Such consolidation on occasion led to collusion on bidding, second sale among dealers, and other infringements of the free market.[29]

The Bay State Fishing Company began to turn a small profit after a year of experimenting, and continued to do so except during the recession of 1908-1909. By 1910 the capital stock was $500,000. In a shift toward control by fish dealers rather than financiers, John R. Neal had acceeded to the presidency and Harrison I. Cole was manager, apparently representing Admiral Bowles's interest in the firm.[30]

In 1910 they embarked on a construction program, deciding it was better to increase productive ability than to pay dividends or increase the capital stock. The Quincy Yard launched the new trawler *Foam* in the summer of 1910, *Ripple* that fall, *Crest* the following March, and *Surf* and *Swell* in December 1911. These vessels, costing $60,000 to $70,000 each, were about ten feet shorter than *Spray,* their most prominent feature being a raised whaleback topgallant forecastle deck to protect the working deck and the forecastle hatch. A generator supplied electricity for lights. They had 450-indicated-horsepower triple-expansion engines and 100-ton capacities in their fish holds. And they went to work, averaging forty-nine trips and two million pounds of fish apiece in 1912.[31]

Hook-and-line fishermen were clearly worried. Not only was the Bay State Fishing Company prospering, otter trawling was also spreading around the world. A Japanese observer had spent time aboard *Spray* in 1907, with the intention of introducing the method in the Orient. French steam trawlers had first appeared on the Grand Banks of Newfoundland that year, and twenty-four were there in 1911. Grimsby trawlers were expected to arrive on the Grand Banks soon, and were already considering fishing the waters off South Africa and New Zealand. China was also being considered.[32]

Inshore, trawling was growing as well. Provincetown beam trawlers had moved into Nantucket Sound in 1908, and otter trawls were introduced there the following year. By 1910 forty otter trawl boats were berthed at Hyannis,

29. *Fishing Gazette,* 31 October 1908, p. 1223; 30 January 1909, p. 130; 1 May 1915, pp. 549-51.

30. Bay State Fishing Company Annual Report, 1911, Baker Library, Harvard University School of Business; *Fishing Gazette,* 25 September 1911, p. 1209.

31. *Fishing Gazette,* 30 April 1910, p. 515; 27 August 1910, p. 1083; 31 December 1910, p. 1650; 7 January 1911, p. 18; *Nautical Gazette,* 10 April 1911, p. 13; *International Marine Engineering* 17 (January 1912): 19; *Fishing Gazette,* December 1928, p. 41.

32. *Fishing Gazette,* 28 March 1907, p. 294; 20 January 1912, p. 67; 29 June 1912, p. 804; *Gloucester Daily Times,* 25 January 1913.

Provincetown fishermen hoist the cod end of their beam trawl aboard their sloop. One of the beam's 'sleds' or runners is partially visible on deck behind the fisherman at left.

New England Magazine, 1910.

sweeping the Sound for winter flounder. By 1913 they had to organize themselves to control their fishing so no individual would glut the market. In Connecticut Ellery Thompson's father reportedly introduced beam trawling in the New London area about 1907 after seeing a beam trawler pictured in a magazine. The otter trawl had apparently reached eastern Long Island already, as the first eastern Connecticut otter trawl was brought over from there about 1909. It seems to have come a few years later to Maine. According to Charlie York the first one in Casco Bay was put to work about 1915. York himself began to use one the following year with his gasoline-powered Hampton boat.[33]

In 1912 opponents began to organize. Newfoundland was alarmed by the French offshore. Nova Scotia had prohibited trawling within the three-mile limit and was calling on Ottawa for a ban offshore as well. In New England, Gloucester led the fight. Capt. F. G. Robinson assured Lunenburg fishermen that Gloucester could raise a million dollars to fight steam trawling. Enlisting popular author James B. Connolly and other supporters, Gloucestermen travelled to Washington to lobby for a bill prohibiting the landing of fish caught with otter trawls in the United States, which was introduced by Congressman Gardner of Massachusetts. The committee on the Mer-

33. *Gloucester Daily Times,* 23 April 1913; Ellery Thompson, *Draggerman's Haul* (New York: Viking Press, 1950); *Fishing Gazette,* 3 February 1912, p. 152; Harold Clifford, ed., *Charlie York: Maine Coast Fisherman* (Camden, Me.: International Marine Publishing Company, 1974), pp. 82-83.

chant Marine and Fisheries turned the matter over to the Commissioner of Fisheries, recommending that the Fish Commission investigate otter trawling in Europe and America, and make a full report.[34]

The opposition to otter trawling was based on three interlocking concerns. First, it was felt that the method would deplete fish stocks. John R. Neal might claim, 'There is not the slightest danger that man can reduce the supply of fish in the ocean. The natural enemies do more to destroy fish than man ever has or ever can,' but the evidence from formerly prosperous New England river fisheries and the halibut and mackerel fisheries suggested that man could indeed reduce the supply of fish in the ocean. Opponents further claimed the North Sea gave perfect evidence of the depletion that otter trawling would effect.[35]

The second concern was that otter trawling represented the beginning of industrial fishing and the end of the self-reliant way of life New England fishermen were accustomed to. Capt. Frank Nunan of Gloucester declared, 'It is labor independence against something not right.' He presented comparative scenarios: 'Take the day before Christmas or the day before a big storm. Old way—"Well, boys, go home. We won't go out tonight." New way—"Well, wife, the fish company says I must go out tonight. You know I am hired. I must go, for if I don't there is someone to take my place on the wharf. Think of me tomorrow."'[36]

The *Portland Express* suggested that steam trawlermen did not need to be real fishermen. 'They can come from Mattawamkeag as well as from Orr's Island, and it matters little whether their knowledge of rigging is confined to tying a knot around a cow's neck so it will not slip and choke her to death.'[37] Never mind that the men aboard the Bay State trawlers were largely hard-bitten Newfoundland and Nova Scotia fishermen, bred in dories; or that, except in Maine, few American-born men were willing to go fishing, however independent an occupation it might be. The fact was that the opponents didn't like this mechanical, regimented intrusion on their way of life.

The third basis of opposition was that steam trawling meant monopoly when all was said and done. Captain Nunan stated, 'We know the backers of the beam trawlers will fight before they give up their plan which is this: to control the fish business; to have their own wharf; to have their own store for fitting out steamers; to have ice houses, railways and lastly, to sell their own fish.' He may have been right. The National Fisheries Company had had such aims.[38]

In its defense the Bay State Fishing Company took four tacks. First, it denied that the method could deplete fish stocks, particularly when pursued on the small scale that the company represented. Second, it claimed that the large amount of fish landed by company boats only tended to reduce the price to consumers, making fish more economical and improving the industry by increasing demand for its product. Third, they correctly claimed that otter trawling was a safer method of fishing than dory trawling. Finally, William Garcelon, speaking for the company, suggested, 'As to the talk of the steam trawl system ultimately developing into a fishing trust, that is all poppycock. The sea is open to anybody, and fish go into one man's nets as soon as into another's. The only way a fishing trust can be formed is to buy up all the wharves and shore lines, and I hardly think that can be done.'[39]

In fact, other companies were getting into the act. Down in New York, a group bought *Heroine,* ex-*Aloha,* formerly Arthur Curtiss James's 160-foot steam brig yacht built in 1899, and rebuilt her as a trawler. She began landing fish at Boston soon after her conversion in 1912. In 1914 the Trident Fisheries Company of Portland refitted the 1912 menhaden steamer *Long Island* for otter trawling. In 1915 she landed the two largest fares taken by an American otter trawler to that time: 280,000 and 300,000 pounds! Inshore, the 1893 Lawley steam yacht *Bethulia* was prepared to try otter trawling on such local grounds as Middle or Stellwagen Bank.[40]

The Bay State Fishing Company itself felt confident enough to order three more trawlers from Quincy. *Billow, Breaker,* and *Wave* were added to the fleet in 1913, bringing the total to nine. These new trawlers apparently tended toward the *Spray* type, without whaleback decks. Pictures suggest that the whaleback bows had brought the vessels down by the head, which was a tendency all of these deep-bowed vessels had anyway. Like *Spray,* the new trawlers made do with an extreme sheer to raise

34. *Fishing Gazette,* 12 February 1912, p. 211; 23 March 1912, p. 373, 383; 30 March 1912, p. 399; *Congressional Record-Senate,* 24 July 1912, pp. 9518-19.

35. *Fishing Gazette,* 7 September 1912, p. 1139; 2 March 1912, p. 259.

36. Ibid., 3 February 1912, p. 131.

37. Ibid., 18 May 1912, p. 633.

38. Ibid., 3 February 1912, p. 131.

39. Ibid., 20 April 1912, p. 481.

40. *Report of the Commissioner of Fisheries for 1915* (Washington, D.C.: Government Printing Office, 1916), p. 62; *Gloucester Daily Times,* 20 October 1913.

Table 1

COMPARISON OF LINE TRAWL CATCHES TO OTTER TRAWL CATCHES, 1913[42]

Vessel	*Catch*	*Trips*	*Average Per Trip*
Pontiac	1,397,000	32	43,650
Josie and Phebe	1,388,200	26	53,400
W. M. Goodspeed	889,300	53	16,800
Foam	2,605,570	52	50,100
Ripple	2,354,800	45	52,300
Spray	2,175,700	41	53,000

the bow, and a protective bulkhead to shield the foredeck. While these were state-of-the-art vessels, electronics as simple as wireless would not be installed for nearly a decade. Like the schooners, these vessels found their way with the sounding lead from the sounding station at the taffrail.

Looking for further markets to absorb the large volume of fish the expanding Bay State fleet was landing, the company made arrangements with the large Burnham-Morrill fish plant at East Deering, near Portland, Maine, to deliver half a million pounds a month. *Surf* was the first trawler to visit Portland, landing a fare in early July 1913.[41]

Obviously the otter-trawl catches were large, but how did they compare to line-trawl catches? The line trawlers set their lines on the bottom from dories. In good weather a schooner might have 20,000 hooks on the bottom within a five-square-mile area. The line trawls would be set and hauled once or twice a day. The steam trawlers shot their nets ten or twelve times a day, sweeping 2.25 million square feet at a pass and a square mile a day.

In Table 1 landings for three schooners and three trawlers, which would generally have fished on the same grounds during the calendar year 1913, are compared. The 1906 knockabout *Pontiac* was driven hard by Capt. Ernest Parsons, and was often among the top money-makers in the market fleet, which landed mixed fresh fish of the season. *Josie and Phebe* of 1908 was the largest Boston schooner, sometimes carrying twenty-seven men. At $48,000 her gross stock or total return in 1912 topped the fleet. *W. M. Goodspeed* of 1908 was always a consistent producer. Incidentally, she would be sunk in a collision with the Bay State trawler *Swell* in 1919. The steam trawlers were *Foam,* first of the whaleback bow

41. *Gloucester Daily Times,* 10, 11 July 1913.

42. *Gloucester Daily Times,* daily landings listed in 1913.

Table 2

PERCENTAGES OF COD, HADDOCK, AND HAKE FROM SOUTH CHANNEL MARKETED BY LINE AND OTTER TRAWLERS, JUNE-SEPTEMBER 1913

Fish	*Line*	*Otter*
Cod		
Large 10 + lb.	22.6%	6%
Market 2½-10 lb.	69%	71.5%
Scrod 1-2½ lb.	8.2%	22.4%
Haddock		
Large 2½ + lb.	82.2%	71.8%
Scrod 1-2½ lb.	17.8%	28.2%
Hake		
Large 6 + lb.	76.7%	40.6%
Medium 2½-6 lb.	23.3%	59.4%

vessels, her sister *Ripple,* and the original trawler *Spray.*

The schooners did well. *Pontiac*'s stock of 1913 was $43,000, second among the market fleet. *Goodspeed* delivered significantly fewer fish, but she must have hit the market right, as her stock was nearly $40,000.

The otter trawl catches were similar in size to the schooner catches but twice as frequent. Quick trips and constant fishing was the secret to success in otter trawling. Even at a low average of two cents a pound for fish they would make nearly $50,000 each. It was true that a steam trawler could pay for herself in a year with good luck and high prices.

The U.S. Fish Commission's field workers were observing this sort of thing through 1913, making trips on both steamers and schooners. In their 1914 report, scientists Alexander, Kendall, and Moore presented six decisions on otter trawling. First, there was no evidence that the New England grounds fished by otter trawls were being depleted. Second, otter trawls did not destroy fish spawn as the spawn rise in the water column. Third, otter trawls did not destroy the bottom environment. Fourth, otter trawling and line trawling could coexist, as much line fishing was done on bottom unsuitable for otter trawling.[43]

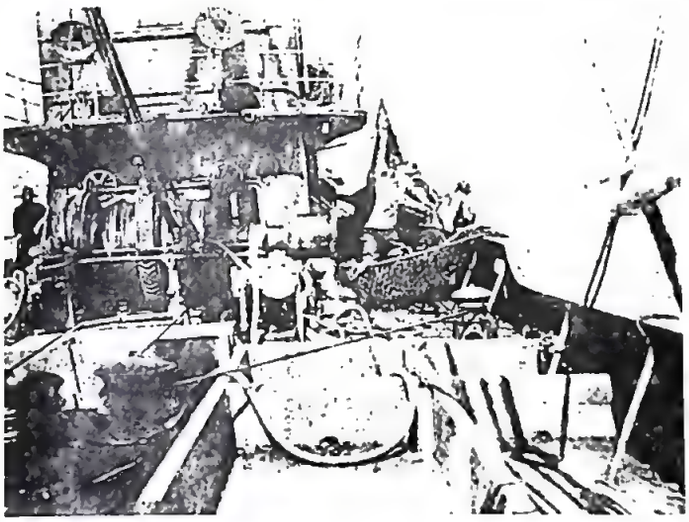
Their fifth observation is suggested by Tables 2, 3, and 4: otter trawls took a large percentage of small fish, or scrod, which would not usually swallow a baited hook.[44] Most of those fish not of marketable size would be de-

43. A. B. Alexander, H. F. Moore, and W. C. Kendall, 'Otter Trawl Fishery,' in *Report of the Commissioner of Fisheries, 1914* (Washington, D.C.: Government Printing Office, 1915), pp. 90-93.

44. Adapted from Alexander, Kendall, and Moore, 'Otter-Trawl Fishing,' pp. 25-31.

stroyed. Line trawls, on the other hand, took more unmarketable fish, especially dogfish, during warm weather. The scientists commented that all of these species were quite marketable in Europe, and there was no accounting for narrow American tastes.

The Commission agreed that the North Sea had been overfished. To prevent that in New England waters it recommended limiting otter trawling north of latitude forty to Georges Bank, the South Channel, and Nantucket Shoals, the areas where it was normally pursued. Only occasionally did the Bay State trawlers venture as far east as Western Bank. The Commission suggested



Looking aft, probably aboard *Foam* on Georges Bank, 1912. The trawl winch is visible beneath the bridge. The after warp passes around fairleads in the foreground. The fishermen may be hauling the trawl aboard.

Report of the Massachusetts Commissioners of Fisheries and Game, 1915.

that south of forty degrees the bottom was suitable for unrestricted flounder fishing.[45]

Somewhat vindicated, the management of the Bay State Fishing Company decided the time was right to reorganize as a diversified fishing and processing company with the intention of dominating the market. The Bay State Fishing Company of Maine was chartered in May 1916 with rights to breed, pack, can, and sell all kinds of fish.

Actually, the company had become a holding company that combined the fishing operations of the Bay State Fishing Company with the processing and marketing networks of eight of the most active Boston wholesale firms: John R. Neal, L. B. Goodspeed, A. G. Baker, B. F. Phillips, Watts & Cook, Story-Simmons, John Burns, and H. A. Rich. Several of these firms had been shareholders in the Bay State Fishing Company from the early days, and most had been involved in the National Fisheries Company scheme.

The Maine company purchased the Massachusetts company for $1.5 million in cash and stock. The other companies also rechartered themselves in Maine and then transferred their stock to the Bay State Fishing Company of Maine. The new company was capitalized at $7 million, with F. Monroe Dyer of New York as president. To establish a plant, the company acquired a wharf in East Boston for $250,000. After the transition, profits for the quarter were $131,000.[46]

Table 3

Comparison of Wastage Between Line Trawl and Otter Trawl Methods, June-December 1913

	Line	*Otter*
Marketable Fish Saved	60.6%	48.4%
Immature Fish	7.6%	39.9%
Unmarketable Species	31.6%	11.7%
Total Waste	39.2%	51.6%

In November 1916 the trawlers *Spray, Foam,* and *Ripple* were sold for $125,000 apiece, apparently all going to Russia as minesweepers. Even before the transfer, the old company had ordered three new trawlers from the Manitowoc Shipbuilding Company in Wisconsin. The reasons for the shift to construction on the distant shores of Lake Michigan are not completely clear. However, Fore River had gone bankrupt building Argentine battleships in 1913, Admiral Bowles was out, and the Bethlehem Steel Company had taken over. By 1916, it was largely engaged in naval construction, whereas Manitowoc was relatively new, small, and looking for business. Close to the midwest iron region, it was probably economical as well.

A competing combination with monopolistic tendencies also appeared in 1916 with the establishment of the Boston Fish Pier Company, which absorbed twenty-eight dealerships. Within a year of the reduction of thirty-seven firms to two, suit was filed to break up these companies under the provisions of the Clayton Antitrust Act, which

45. Ibid., pp. 96-97.

46. *Fishing Gazette,* 27 May 1916, p. 693; 22 March 1919, p. 464.

Breaker (117.8 x 22.5 x 11.6), one of the three trawlers built at Quincy in 1913. She was photographed in Boston Harbor by Nathaniel Stebbins, 2 October 1914.

Courtesy of Society for the Preservation of New England Antiquities.

forbade interlocking directorates with capitalization exceeding a million dollars, and the acquisition of stock companies when the result lessened competition. Even the New England Fish Exchange was implicated in pricing improprieties.[47]

The Bay State Fishing Company found itself in an enviable position in 1917. It was a seller's market as Great Britain sought American fish and the United States Government urged consumers to eat fish rather than meat. Even though six of its trawlers were requisitioned as minesweepers once the United States entered the war, the Bay State Company bore the brunt of this wartime demand with its six active trawlers, especially during the harsh winter of 1917-1918. In 1917 the company landed thirty-six million pounds, for a gross value of $15 million. This was roughly a third of Boston's fish landings that year.[48]

Halifax purchased its first otter trawler in 1915. Gloucester, which had harbored small inshore trawlers for several years, finally gave in to steam trawling in 1917. The Gorton-Pew Fisheries Company built two large wooden trawlers, *Walrus* and *Seal,* both at Essex, Massachusetts. Other companies were also rushing to join the apparent otter-trawl bonanza, including the East

47. *Gloucester Daily Times,* 12 July 1919; *Fishing Gazette,* 8 March 1919, p. 382.

48. *Gloucester Daily Times,* 23 June, 29 July 1919; *Fishing Gazette,* April 1920, p. 39; 'Financial Writer Blames Haddock for Trawler Tie-up,' *Fishing Gazette,* March 1921, pp. 47, 51.

Table 4

Comparison of Unmarketable Species Taken by Line and Otter Trawlers on South Channel, June-November 1913

Fish	*Line*	*Otter*
Silver Hake	6.1%	4.3%
Flounders	.5%	3.4%
Monkfish	.3%	1.0%
Dogfish	18.0%	1.7%
Skate	3.0%	1.6%
Total	27.9%	12.0%

Comparison of Immature Marketable Species Taken by Line and Otter Trawlers on South Channel, June-November 1913

Fish	*Line*	*Otter*
Cod		2.7%
Haddock		22.4%
Hake	8.3%	19.2%
Pollock		
Halibut		
Sole		
Total	8.3%	44.3%

Coast Fisheries Company of New York and Rockland's Great Eastern Fisheries Corporation.[49]

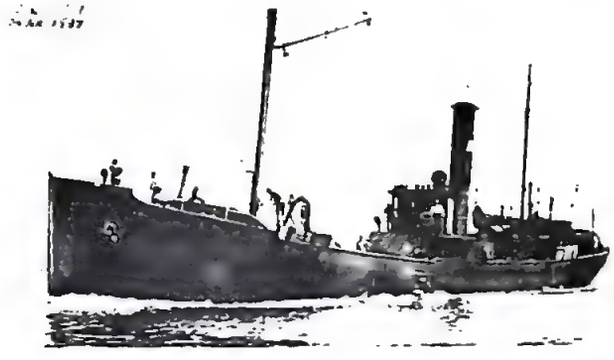
Labor turmoil struck as the war ended. As early as 1912 the Bay State Company's marine firemen had struck for better wages and hours, but now the fishermen themselves struck. The Fishermen's Union walked out in December 1918 when their demand for larger crews on steam trawlers was not met. Eight trawlers were tied up for a month until the Massachusetts Board of Conciliation and Arbitration upheld the fishermen's demand and the crews were increased by two men. Then the captains and mates demanded increases in pay, as did the engine-room crews. The War Labor Board arbitrated their demands.[50]

49. Frederick William Wallace describes the beginning of Nova Scotia steam trawling and the procedure aboard the British-built trawler *Rayon d'Or* in *Roving Fisherman* (Gardenvale, Quebec: Canadian Fisherman, 1955), pp. 313-32. While British trawlers had operated out of Nova Scotia ports since 1911, the first was purchased by Canadian interests in 1915, and only two were owned there in 1917. The Nova Scotia port of Lunenburg got its first beam trawler, the *Promotion,* from a Shelburne shipyard in 1919. *Gloucester Daily Times,* 13 May 1919. The F. E. Booth Co. brought the English steam trawler *Ituna* to the West Coast in 1918, where she operated with a British crew. *Gloucester Daily Times,* 1 May 1919.

50. *Fishing Gazette,* 13 July 1912, pp. 882-83; 20 July 1912, p. 914; 15 January 1916, p. 83; 1 February 1919, pp. 182-83; 8 February

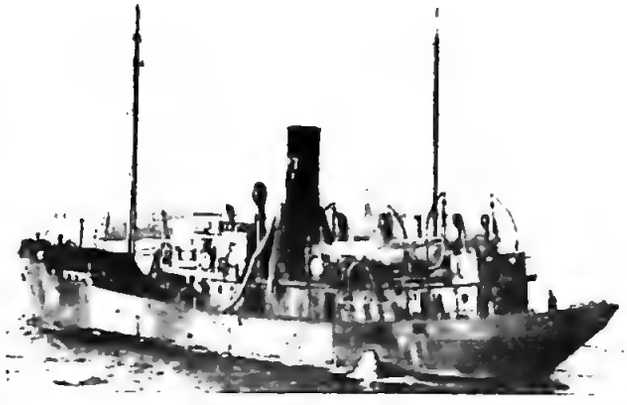
At the same time, fish prices plummeted in the post-war economic contraction. For the company, prices dropped from an average of 4 cents a pound in 1917 to 2½ cents in 1919. Steam trawlermen, paid a monthly wage plus a bonus, were not greatly disadvantaged, but line fishermen, who received a percentage of the returns of each voyage, were hurt badly. The Fishermen's Union called for a fixed minimum price for fish. The Bay State Company made an offer acceptable to its crews, but the fishermen wanted industry-wide implementation. When the wholesalers refused, the fishermen struck in July 1919. The Massachusetts Attorney General declared that fishermen did not own the fish they caught so they could not set prices. He also claimed that price setting was not a legitimate purpose of collective bargaining, but the fishermen had a stranglehold on the New England fish supply. In mid-August a Board of Arbitration agreed to a minimum price for fish, and the great fishermen's strike was over.[51]

Meanwhile, the company had a further serious problem: the antitrust suit pending since June of 1917 under



Tide (135 x 22.8 x 13.4), third of the six trawlers built at Manitowoc between 1916 and 1918.

the same Clayton Act that gave the fishermen the right to strike. The company was charged with being in unreasonable restraint of interstate trade because it held 'an undue control of the market during certain seasons of the year and the evidence discloses that the power which it exercised was a menace to the trade and likely to result in driving other dealers out of business or into its combination.'[52]



Kingfisher (140.2 x 25 x 14.6), of Atlantic Coast Fisheries, was built as *Marignam* for the French Government by the Foundation Company of Savannah, Georgia, in 1919. The Bay State trawlers *Breeze, Gale,* and *Sea* were very similar.

A Massachusetts special committee charged that steam trawler profits had doubled since before the war, and that the wholesalers manipulated prices so fish was actually cheaper in Toronto than in Boston. Gorton-Pew was exonerated, but the Boston Fish Pier Company and the Bay State Fishing Company were indicted. Both were ordered to divest themselves of their subsidiary dealers. The Bay State Company's officers were given jail sentences, and the company itself was charged with half a million dollars in war profits taxes.[53]

Through its troubles the company pursued a policy of veiled threats mitigated with conciliation. While asking for cooperation to salvage Boston's fish business, it also threatened to relocate. New London, Connecticut, made an attractive offer, which the company strongly considered because that city was closer to Georges Bank and the lucrative New York market than was Boston. There were also rumors that the company was considering dissolving its fleet, which would be a blow to the Boston industry.[54]

While Massachusetts was breaking up its fishing 'trusts' Maine harbored the largest fishing company yet. In August 1919 the East Coast Fishing Company of New York and the Great Eastern Fisheries Company of Rockland merged as the East Coast Fisheries Company of Rockland. Based on the wartime success of the Bay State Company, Ivan Taylor, a New York entrepreneur, had

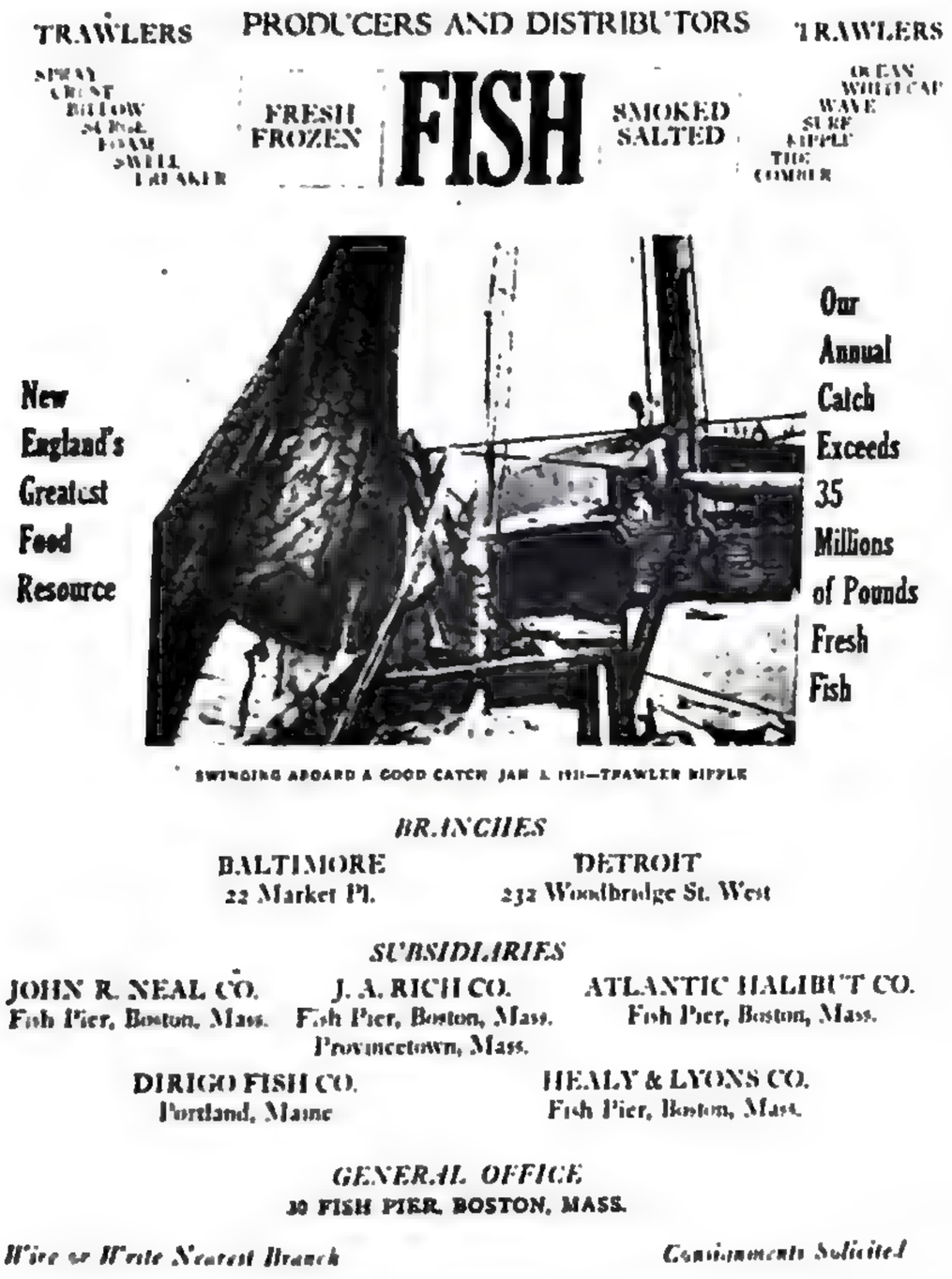
1919, p. 224; 1 March 1919, p. 342; *Gloucester Daily Times,* 31 May 1919.

51. *Gloucester Daily Times,* 29 July 1919; *Fishing Gazette,* 22 February 1919, p. 303; 12 July 1919, p. 1095; 19 July 1919, p. 1135; 26 July 1919, p. 1184; *Gloucester Daily Times,* 4 August, 14 August 1919.

52. *Gloucester Daily Times,* 12 July 1919.

53. 'Atlantic Fisheries,' *Fortune,* April 1935, p. 146; *Gloucester Daily Times,* 3 May, 10 July, 12 July 1919.

54. *Gloucester Daily Times,* 29 May, 2 June, 5 June, 12 July, 23 July 1919; *Fishing Gazette,* 14 June 1919, p. 944.



Bay State Fishing Company advertisement, *Fishing Gazette,* April 1921.

established the East Coast Company with surplus French trawlers, and undertook a building campaign until the fleet totaled twenty. These vessels were well fitted out, including wireless communication. Another competitor, the Atlantic Coast Fisheries Company, which flourished from its fish weirs and freezers at Provincetown, also expanded. Atlantic Coast moved where Bay State did not, establishing a plant at Groton, Connecticut, in 1922.[55]

With its officers destined for jail terms, the Bay State Company acquired new management in 1920. B. Devereux Barker, a Boston attorney who specialized in resuscitating dying companies, was hired as president. The war profits tax assessment was compromised at $131,000, and the company began paying off its $600,000 in loans for its expansion.[56]

55. *Gloucester Daily Times,* 26 August 1919.

56. 'Atlantic Fisheries,' *Fortune,* April 1935, p. 146.

But the costs of steam trawling were high and getting higher. Costs of gear had risen as much as 200 percent over prewar costs. Coal was $15 a ton, and higher during coal strikes. Furthermore, the labor board of arbitration had approved wage plus bonus rates for 1920 that resulted in wage outlays as high as 90 percent of the gross stock if the average price of fish was only 2½ cents a pound. The steam trawling companies limped through the year, looking ahead to recouping their losses during

Bay State Fishing Company advertisement, ca. 1925.

the undersupplied, high-priced winter market. But mild weather kept a large schooner fleet at sea and fish prices remained low. The red ink grew until the companies tied up their vessels when the wage agreement expired in March 1921.[57]

The Bay State Company put together a couple of non-union crews and began to operate on a small scale in May 1921, benefitting when its chief competitor, the East Coast Fisheries Company, collapsed. The surviving companies proposed a wage scale that represented a 20 percent reduction in total wages, and eventually agreement was reached.[58]

The company also survived because management had begun to face the problem of its limited marketing ability. It continued to supply Burnham-Morrill regularly as it had since 1913, and in 1919 had contracted to supply a New York dealer with a vessel load of haddock a week. It tried to expand its New York influence by sending trawlers to unload there during the railroad strike of 1920. But further markets were also necessary. A rail-

57. 'Trawler Operators Seek Way Out of Tie-up,' *Fishing Gazette,* June 1921, p. 9.

58. Ibid., July 1920, p. 45.

road car of fish was sent to Detroit in 1920 to encourage fish consumption in the interior. Stands were opened in various midwestern cities, and even in automobile factories, and carload shipments were sent to other cities.[59]

In 1921 or 1922 Barker had an inspiration that revolutionized the industry: take the boneless cut of fish prepared in the highest quality trade, call it a fillet, and sell it to the masses. With no bones and no waste, the fillet was the housewife's dream. As the fillet caught on throughout the industry, marketing became the name of the game. The Bay State Company developed its Forty Fathom brand, packed in tins and guaranteed fresh if sold the week they were shipped. The company first advertised Forty Fathom fillets in the *Fishing Gazette* in January 1923, and by fall was selling haddock, cod, and smoked fillets through its marketing subsidiary, the Forty Fathom Fish Company. Landed at the company wharf in East Boston, taken out at the going Fish Pier price for payment of the crews, processed, and shipped out quickly, the fish were of good quality and popular.[60]

During the 1920's the company developed a flexible system to take advantage of price fluctuation in the market. Like many of the other steam trawling companies, it rented RCA wireless radio units for the trawlers. A dispatcher plotted the position and catch of each vessel, calling them in or ordering them to other grounds as conditions warranted. Meanwhile, to supplement the catches of the trawlers, company buyers bid on fish at the Fish Pier when prices were low. When prices were high, the trawlers might deliver their catches to the Fish Pier rather than the company filleting plant to profit from high bids for fish in the round.[61]

Although the new filleting operation was successfully received, it was apparently so labor intensive that the costs of production and sale averaged 95 percent of the profit from sales. This narrow profit margin did not provide much of a cushion, especially after the company lost its lucrative subsidiaries. It took several years to recover from divestiture and to pay the fines imposed by the courts. A $250,000 profit in 1921 was followed by a

Fabia (131.6 x 25 x 13.4), first successful diesel trawler, was built by Frank Rice of East Boothbay, Maine, for John Chisholm of Gloucester in 1920. She had a 360-horsepower engine.

Courtesy of Jeff Thomas.

decline in sales of 25 percent and five years of red ink in the ledgers, with the 1924 loss totaling $827,000. By 1927 it was finally making a profit and paying dividends again.[62]

Even as the company achieved the full range of functions that Frank Nunan had anticipated, the opportunities for an otter trawling monopoly were becoming more remote. Since the beginning, large otter trawlers had been steam powered, carrying bunkers for fifteen or sixteen days of continuous steaming. The capitalization required to build and operate such a vessel ensured a limited fleet of otter trawlers. But since Dexter Malone

59. *Fishing Gazette*, 19 April 1919, p. 624; 4 October 1919, p. 1609; May 1920, p. 36; 'How the Fish Car Sales Were Handled,' *Fishing Gazette*, February 1920, pp. 12-13.

60. 'Atlantic Fisheries,' *Fortune*, April 1935, pp. 145, 151; Frank H. Wood, *The Story of 40-Fathom Fish* (Boston: Bay State Fishing Company, 1931), p. 8; *Fishing Gazette*, January 1923, p. 43; October 1923, p. 31.

61. 'Atlantic Fisheries,' *Fortune*, April 1935, pp. 154, 156; Frank H. Wood, *The Story of 40-Fathom Fish*.

62. Annual Reports, Bay State Fishing Company, 1921-1928, Baker Library, Harvard University School of Business.

Flow in the Kennebec River, 1929. *Ebb* and *Flow,* launched by Bath Iron Works in 1929, were the Bay State Company's first diesel trawlers. Equipped with 500-horsepower diesels, they measured 122.4 x 24.1 x 11.5 and closely resembled the earlier steam trawlers.

Courtesy of Maine Maritime Museum, Bath, Maine.

had put a diesel engine in *Manhassett,* the diesel had begun to find acceptance in the fishing fleet. In 1919 the large Gloucester trawler *Mariner* was launched with diesel-electric drive, but proved to be an overly expensive experiment. In 1920 a very successful diesel otter trawler, *Fabia,* was built at East Boothbay, Maine, and demonstrated that a large diesel could compete with a steam engine for trawling.[63]

The real effect of the diesel or crude oil engine was to democratize otter trawling. Small gasoline-powered flounder 'draggers' were already common in Massachusetts and New York waters, and powered scallop draggers were active in Maine, but there was no alternative power for larger offshore vessels before the diesel. A diesel trawler did not require the engineroom crew of a steam trawler so crew size could be cut. Diesel fuel was cheaper and more compact than coal. A diesel engine was safer and more economical than a comparably sized gasoline engine, so medium-sized power vessels could now participate. It was no longer necessary to capitalize a large company to go otter trawling.[64]

In 1921 *Blanche Ring,* an auxiliary schooner otter trawler with an oil engine was launched at Rockport, Massachusetts. The *Fishing Gazette* noted, 'whatever

63. In a 1928 advertisement, the Electric Boat Company, which had taken over the New London Ship and Engine Company, made a comparison between steam and diesel engines. They claimed a 60 percent savings in space for a diesel engine and tanks over a steam engine and bunkers for 100 tons of coal. They also claimed an annual saving of $18,000 to $20,000 in fuel and operating costs. However, until 1929 the only Nelseco diesel trawlers of a size comparable to the steam trawlers were *Mariner, Fabia, Boston* ex-*Ripple,* and *Cormorant.*

64. See Percival W. Wheeler, 'Development of the Motor Fishing Vessel on the Atlantic,' *Fishing Gazette,* March 1920, pp. 9-12.

else she may be or may do, the *Blanche Ring* rings down the saddening ledger sheets displaying lost profits from expensive engine room crews on trawlers. If there is virtue to be found in dragging for fish it seems to lurk modestly in this new vessel.'[65] *Blanche Ring* was the progenitor of the 'eastern rig' dragger, with pilothouse aft like a schooner and gallows for hauling her gear over the side like a steam trawler. The 'western rig' dragger, with pilothouse forward and trawl hauled over the stern, appeared in southern New England in the 1920's, and was closely related to the small powered pleasure and work boats with pilothouse forward of a decade earlier, such as those of the Post boat works of Mystic, Connecticut. Operation of these vessels was enhanced with the development of small hoisting engines such as the Hathaway trawl winch, introduced in 1920 on New Bedford Capt. Dan Mullins's *Mary*.[66]

As the economy rebounded from the recession that had stalled the steam trawling fleet, the dragger caught on in the outports, such as New Bedford and Nantucket. In 1925 the *Fishing Gazette* announced the trend.

> The otter trawler or 'dragger' is coming into favor in the American fisheries. Within the past year or two, the switchover from hook-and-line to 'dragging' by the shore and offshore fishermen of the North Atlantic states, has been almost revolutionary. . . . If America has been slow to adopt the trawl method of fishing, we have made a distinct advance in the direction of trawler propulsion. Several of the vessels now in service are equipped with oil-engines and they have worked satisfactorily. . . . The shore fleet of 'draggers' as they are called are all motor propelled, practically all oil-engined. They range from boats of 40 feet in length with a crew of three men, to vessels of 90 feet, manned by eight men—these latter craft are capable of fishing offshore on occasion.[67]

With their significant savings in fuel and manpower, these larger draggers could be competitive with the steam trawlers. They represent the trend in otter trawler design that has continued into the present day.

In 1925 the original *Ripple,* which had served as a minesweeper and private vessel since the company disposed of her in 1916, was outfitted at the New London Ship and Engine Company as a diesel trawler. The Massachusetts Trawling Company renamed her *Boston* and brought her back to compete with her sisters in the Bay State fleet. In 1929 the original *Spray* returned as *Patrick J. O'Hara,* with a 500-horsepower diesel in place of her steam engine.[68]

The Bay State Company built its first diesel trawlers that year. The company had been planning to upgrade its fleet for several years, and the profit it began turning in 1927 allowed it to make the investment. The Bath Iron Works constructed the trawlers, christened *Ebb* and *Flow*. Other than their diesel engines, they closely resembled the company's steam trawlers.[69]

Further improvements were taking place in otter trawling technology. In 1925 the French Vigneron-Dahl (V-D) trawl was licensed in America. With doors up to 150 feet ahead of the wings, it allowed the net to tend the bottom better than the original design. The sticks at the wings, called 'dhanlenos' after an English tightrope walker, indicated the way the trawl had towed by the wear on their feet. If they were worn at an angle the fishermen could adjust the tension between the headline and footrope to get the trawl to set properly.[70]

In 1929 otter and V-D trawls accounted for 57 percent of the New England fish landed, and nearly three times the amount landed by line trawlers. This was a sizable increase from 32 percent in 1922. After 1915 the volume of fish landed tended to fluctuate in concert with the number of large otter trawlers in service. The number reached seventy-two in 1930, over 25 percent of which were owned by Bay State. That year the Company landed 58,600,000 of the 230,320,000 pounds of fish landed at Boston.[71]

In the early 1930's the Bay State Fishing Company was instrumental in testing the so-called New England trawl, which was an improvement of the V-D trawl. Leaders between the ground cables and the wings allowed the headline to rise, catching fish higher in the water column. Rather than the usual four-foot height, the headline might reach eight feet. Observations showed that the sand or mud cloud raised by the doors and ground cables in advance of the net herded fish into the

65. 'New Type of Trawler Goes to Sea,' *Fishing Gazette,* December 1921, p. 25.

66. 'Small Otter Trawl Hoisting Equipment,' *Fishing Gazette,* January 1922, p. 18.

67. 'Otter Trawling in Atlantic Fisheries,' *Fishing Gazette,* review number, 1925, pp. 61-63.

68. *Marine Engineering and Shipping Age,* August 1928, p. 428; May 1929, p. 253.

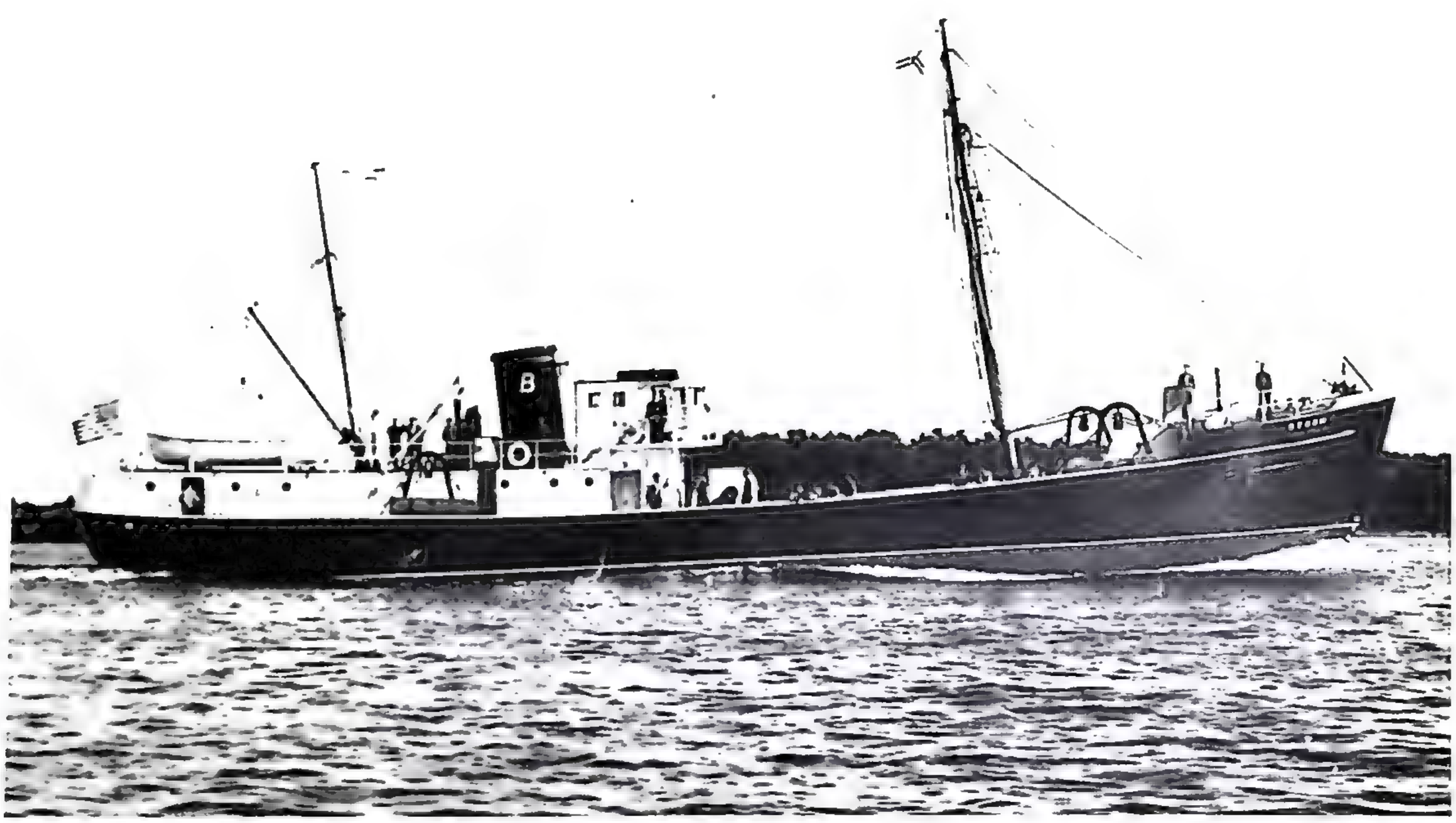
69. With 500-horsepower Winton diesels, these trawlers could make 11 knots. They had hot and cold running water in the crew quarters. The New England Trawler Equipment Company produced their winches and trawl gear.

70. Symonds and Trowbridge, 'Development of Beam Trawling,' pp. 361-62.

71. U.S. Bureau of Fisheries, *Annual Report for the Fiscal Year 1930* (Washington, D.C.: Government Printing Office, 1931), p. 250.

path of the trawl, so it was advantageous to have the doors far ahead.[72]

Only a few years after the fish fillet captivated the market, a promising new process appeared in Gloucester.



Storm, first of the company's 'all-American' trawlers, under way in the Kennebec River, 1936. *Surf*, *Swell*, and *Tide* were also built to this model by Bath Iron Works. All measured 131.2 x 25.1 x 12.1, with 750-horsepower diesel engines.

Courtesy of Maine Maritime Museum, Bath, Maine.

Clarence Birdseye perfected a quick-freezing method for fish, inspired by his observations of frozen fish and game in wintry Labrador. In 1925 Birdseye patented his apparatus, which flash-froze fillets between metal belts. His General Foods Company had operated on a small scale for several years when the Postum Company, a cereals firm of Battle Creek, Michigan, became interested in the potential of the process. Postum acquired General Foods in 1928, at the same time reincorporating itself as the General Foods Corporation. The widely diversified General Foods Corporation retained the Gloucester firm as its frozen seafood subsidiary General Seafoods, and began to build it a fleet in 1929.[73]

Bay State's chief competitor Atlantic Coast Fisheries retooled its Groton plant in 1928 to freeze fillets in a process devised by Harden F. Taylor, its chief researcher and later director. Atlantic Coast also diversified by purchasing wholesalers in the Midwest and Canada, including Maritime National Fish, Ltd., which operated the

72. Symonds and Trowbridge, 'Development of Beam Trawling,' pp. 362-63.

73. 'General Foods,' *Fortune*, October 1934, pp. 135, 137; 'Atlantic Fisheries,' *Fortune*, April 1935, p. 152.

only three otter trawlers licensed by the Canadian Government.[74]

The fishing industry was hit hard during the early years of the Great Depression. Bay State Fishing Company profits fell 75 percent from fiscal 1929 to 1930, even though sales increased. The downward trend continued into the red in 1931, and the following year a drastic drop in haddock landings on Georges Bank cut company production and sales nearly in half. Coupled with low meat prices, especially for pork, the chief competition for fish in the marketplace, the haddock shortage concerned the company's management enough that they discussed consolidation with General Seafoods.[75]

But the company decided to go it alone expansively, acquiring the Beacon Fisheries Company in 1932 and the Libby-Burchell Fisheries plant at Vinalhaven, Maine, in 1935. Atlantic Coast Fisheries, which normally had twice the annual revenues of the Bay State Company, was in worse trouble. It dove into the red in 1930, closed its Groton plant the following year, and divested itself of most of its subsidiaries. General Seafoods also operated at a deficit until 1935.[76]

Despite labor troubles 'fomented by outside agitation,' the Bay State Company continued to economize in its operations and earned profits in 1933 and 1934. Its 1934 profit of $51,000 was based on a catch of 38,000,000 pounds, caught at 2.39 cents a pound and sold at 2.54 cents a pound. The company's profit equalled a quarter of a cent a pound![77]

The industry began to turn around in 1935. Fish stocks were plentiful again, and the great drought of 1934 had caused meat prices to climb sharply. The misfortune of farmers and ranchers benefitted fishermen. As a cheap alternative to meat, fish was back in favor.[78]

The Bay State Fishing Company took advantage of improving revenues to replace its aging trawlers, some now twenty-five years old. Bath Iron Works got the contract in 1936 for three diesel trawlers, hailed as the first 'all-American' trawlers, without European influences. *Storm, Swell,* and *Surf* were built for $200,000 apiece. They had comfortable accommodations, including showers. Their hulls were streamlined, designed not to go down by the head when loaded. Most significantly, they had refrigerated, nickel-lined fish holds to keep the ice from melting and to keep the fish in perfect shape. They were considered the vessels of the future.[79]

But the future appeared uncertain for the company. Despite its new vessels and an $88,000 profit in 1937, the processing plants and the rest of the fleet were verging on obsolescence. The figure for depreciation and obsolescence was nearly 50 percent of the total value of the capital assets in 1938. The company also faced $225,000 in mortgages on the new vessels due between 1939 and 1941. With General Seafoods now on a solid footing, its frozen fillets having been fully accepted in several grocery chains, talks were renewed between the two companies.

General Seafoods offered $1,260,345 plus coverage of unpaid taxes and all debts to acquire the assets of the Bay State Company, which were listed at $1,620,910. When its stockholders approved the offer in October 1938 the Bay State Fishing Company ceased to exist.[80]

So passed a controversial and often maligned firm. Through its successes and failures can be traced many of the developments that have shaped the present New England fisheries. From the outset it had faced opposition for its intrusion of mechanized technology into a labor-intensive hand industry. Even today, the environmental effects of the technology it introduced to New England waters are subject to debate. In its business practices it often fit the worst image of business trusts of the period, seeking to dominate an informally organized industry with ruthless determination.

Nevertheless, in its thirty-three years of existence the Bay State Fishing Company had an impact on the New England fishing industry that far outlasted the company itself. Through its strongly financed and determined effort, the British otter trawl method of bottom fishing was introduced on a large scale, and within a quarter of a century became the primary New England method. The company also pioneered the marketing of boneless fish fillets, which rapidly came to dominate New England fish processing. For these two accomplishments the company represents the foundation on which the modern New England fishing industry stands today.

74. 'Atlantic Fisheries,' *Fortune,* April 1935, pp. 79, 146.

75. Annual Reports, Bay State Fishing Company, 1929-1932; 'From the Drought, An Opportunity,' *Fortune,* April 1935, p. 69.

76. Annual Reports, Bay State Fishing Company, 1932, 1935; 'Atlantic Fisheries,' *Fortune,* April 1935, p. 146.

77. Annual Reports, Bay State Fishing Company, 1934.

78. 'From the Drought, An Opportunity,' *Fortune,* April 1935, p. 69.

79. 'New Forty Fathom Diesel Trawlers,' *Marine Engineering and Shipping Review,* October 1936, pp. 547-49.

80. Annual Report, Special Notice to Stockholders, Bay State Fishing Company, 1938.

Book Reviews

DAN VAN DER VAT, *The Grand Scuttle: The Sinking of the German Fleet at Scapa Flow in 1919* (London: Hodder and Stoughton, 1982). 6½" x 9½", cloth, 240 pages, 24 illustrations, 2 appendices, a note on sources, index. £9.95.

Among the ironies of history is the use to which the last remains of the once proud Imperial High Seas Fleet are being put (p. 214):

> The reason why recovery work has never ceased at Scapa Flow . . . is summed up in the one dread word: Hiroshima. From the time of the explosion of the first atomic bomb, the earth's atmosphere has been polluted by an unnaturally high quantity of nuclear radiation. Enormous quantities of air are sucked into the process of manufacturing steel. It follows therefore that all steel made after 1945 contains significant traces of radiation.
>
> Thus for nearly forty years high grade steel has been recovered for use in the fabrication principally of scientific instruments which to be effective must be free of trace radiation.

But perhaps the larger irony was the fate of a fleet which came to battle but once—Jutland—where, from a narrow tactical standpoint it could be said to have 'won,' but certainly from the larger strategic view, to have lost utterly.

One often asks why it was built in the first place, considering Germany's geographical isolation from the sea, for no matter how large and powerful it was it could be effectively bottled up by a far smaller Royal Navy force. The answer, however irrational, lies in man's habituation (is it in the genes?) to arms races.

Mr. van der Vat, a veteran London journalist, fell upon his subject by chance: The *Times* in 1978 sent him to Orkney '. . . to cover a seal-cull which never happened.' His proximity to Scapa excited his interest and he embarked upon research which has culminated in this excellent book. He covers in some detail the inception of the German-British naval arms race from the turn of the century to the beginning of World War I; he then treats rather scantily of war ops—but what is there to say about important surface warfare except Jutland?

Naturally the scuttling itself occupies the largest portion of his book. Having fluent German (though of Dutch origin) he made full use of the Federal Republic's archives and corresponded extensively with naval people in West Germany, including an old sailor who had written an eyewitness account. With the possible exception of the complete accounts by Admiral von Reuter (see p. 233) the author gives his readers the best relation to appear thus far in English.

The book's last section deals with the sixty-year history of salvage of the fleet and is indeed a fascinating tale of courage, derring-do, of financial disaster and gain. It would be interesting to discover how many advances in salvage techniques devolved from these lengthy and many-sided operations.

Finally let it be said that the book is exceedingly well written; how could it not be by a *Times* staffer? Albeit there are no footnote citations, van der Vat's short 'note on sources' contains all we need to know about where he got his stuff. This book thus gives us the overall view; for a specific one we still must await the full translation both of von Reuter's memoirs and his ops report to his superiors.

JOHN C. BOWER, JR.
The Bostonian Society

EDWIN P. HOYT, *Submarines at War: The History of the American Silent Service* (New York: Stein and Day, 1983). 6½" x 9½", cloth, 329 pages, diagrams, sketch maps, numerous photographs, bibliographical notes, bibliography, index. $18.95.

Everyone now knows something of the dismal history of the United States Navy's defective torpedoes in World War II. In this his latest book Mr. Hoyt devotes many, many pages to this more-than-twice-told tale.

First there appeared Theodore Roscoe's USNIP *United States Submarine Operations in World War II* in 1949 which, although slangy in a gung-ho sort of way should still be considered the official history. Roscoe devotes no less than thirteen double-column quarto pages to the problems of the Mark XIV torpedo and the Mark VI magnetic detonator. Next, in 1966, W. H. Holmes' *Undersea Victory* explored the matter once again with emphasis placed on the effect that excessive secrecy and naval political infighting had upon the torpedo failures. Finally, there was Clay Blair's monumental (1,071 pages) *Silent Victory* of 1975 wherein, between pages 61 and 818 there appear no less than forty citations bear-

ing on torpedo problems; pages 435 to 439 give us, I believe, the final word. That I have failed to cite Admiral Lockwood's several books is intentional, for although it was he who bears the credit for debugging the Mark XIV, the accounts of his victories over naval ordnance failures are best related by Roscoe, Holmes, and Blair.

Thus the question of the need for Mr. Hoyt's book arises. It opens with a brief history of the submarine—or more properly, 'submersible'—from its beginnings to the onset of World War II; the last few pages deal briefly with design developments, including nuclear power, following that war. The middle, and the bulk, relate in some detail World War II ops—but considering the work of his predecessors, is it quite enough? The reviewer, with all due respect for the time and work getting out a book, thinks not.

JOHN C. BOWER, JR.

The Bostonian Society

RICHARD HENDERSON, *Philip L. Rhodes and his Yacht Designs* (Camden: International Marine Publishing Company, 1981). 415 pages, 8¾″ x 11½″, hard cover, 86 black and white photographs, 250 drawings, index, appendix. $35.00.

Philip Rhodes was a versatile naval architect whose successful designs include the eleven-foot *Penguin;* ocean-racing, commercial and naval vessels; the 1962 America's Cup defender; and production boats including *Ranger, Swiftsure, Vanguard,* and *Reliant.* Rhodes is considered preeminent in the field of yacht design.

Ninety of Rhodes' 300-plus designs are described in Henderson's book. Most descriptions are illustrated with drawings of sail plans, accommodations, lines, and a photograph of the vessel. Descriptions consist of a discussion of design features, the evolution of the design, and in some cases a review of the boat's prominent owners, racing record, and history. The photographs and drawings are reasonably clear (with the exception of fine print on drawings), well chosen, and numerous.

The illustrations Henderson has included are an effective means of augmenting the description of a boat. Profile sketches and photographs convey the boat's appearance and the drawings of lines can provide a knowledgeable reader with an indication of sailing qualities. The collection of illustrations Henderson has provided will enable some readers to deduce a good deal about the unique characteristics of Rhodes' work. Most readers, however, will need some help, which Henderson has not provided.

Naval architecture is a combination of science and art in which the designer must make countless decisions to satisfy conflicting requirements. Shall he give the boat a long keel for directional stability, or minimize drag with a fin keel? Shall he give her the stability and roominess that comes with broad beam, at the expense of windward performance? Shall he enhance her accommodations with high freeboard at the expense of windage and aesthetics? Shall her rig be selected for ease of handling or maximum performance? If performance is to be maximized, on which point of sail? These, and many other aspects of boat design are extremely controversial. Successful designers have widely differing views on the optimum design parameters and configuration. Each must use his own judgment, and the result is a unique design which is representative of his design philosophy.

Henderson has said little about Rhodes' design philosophy. There is little discussion of unique characteristics which show up frequently in Rhodes' work, and only a token effort to compare Rhodes' philosophy to that of his prominent contemporaries. As a result this book is more of a catalogue of Rhodes' designs than an assessment of them.

The text of the book is somewhat superficial, and the drawings and photographs are therefore its principal attribute. Those who do not have books on other designers may find this too narrowly focused and a more general book such as Bill Robinson's *The Great American Yacht Designers* (which includes a chapter on Rhodes) more useful. On the other hand, for those who own a Rhodes' yacht, aspire to own one, or just admire them, this book is worthy of consideration.

P. DOUGLAS BURGESS

Marblehead, Massachusetts

NORMAN POLMAR, *Guide to the Soviet Navy* (Annapolis, Maryland: Naval Institute Press, third edition, 1983). 9¾″ x 9¾″, cloth, xiii + 465 pages, approximately 400 photographs, ship drawings, appendices, index. $36.95.

This book is an extraordinary compendium of information about all the aspects of the world's second largest navy, put together by a well-connected and insightful author. It quite clearly represents the distillation, over many years, of a huge amount of naval intelligence (including the most sensitive) as well as a considerable number of technical analyses by the various branches of the United States Navy. Following the format of Siegfried Breyer's highly regarded book of the same title published in 1970,

Mr. Polmar has produced, in this new joint edition, a work which stands as the most authoritative examination of the past, present and possible future of the Soviet Navy that is currently available.

The reader will find chapters covering the history of the development of Soviet naval forces, their organization, missions, personnel and supporting industrial facilities. The volume is replete with photographs, most of which are of very high quality, depicting Soviet naval surface ships, submarines, aircraft, amphibious vessels and a great array of naval auxiliaries, merchant ships and fishing ships. Close-ups of special features of weaponry and electronics are also presented. The armament and principal characteristics of each type are stated, in detail for classes constructed within the past three to five years, but naturally in lesser detail for classes whose lead ships have only recently appeared.

The ship types in which the USSR leads the world—namely hovercraft for amphibious operations, high-speed missile-equipped small craft (some with hydrofoils), cruisers with antiship missiles, etc.—are described and depicted. It is very properly pointed out, in an extensive chapter on missions, strategy and tactics, that the USSR developed those types for missions arising out of its unique geographical situation. The latest achievements of the Soviet naval construction program, the nuclear-powered cruiser *Kirov* and the carrier *Kiev*, are treated in detail. There is a very complete chapter on submarines. The number of innovative Soviet ship types is striking. Another chapter is devoted to the increasingly important naval air arm. A useful table shows the growth of the Soviet Navy by ship type and number since 1945.

Firm data on submarines is, of course, harder to come by, at least by the presently available means. Like the iceberg, the major portion of their hulls is under water. There may be some naval architects in this country (including this reviewer) who would question the author's assertion that the ALFA class submarine is capable of forty-two to forty-five knots.

The author is to be commended for presenting the first exposition of actual Soviet ship type designations to appear in print. The clarification of the Soviet designation 'SKR' as a 'Patrol Ship' is particularly welcome, as this designation, previously rendered as 'Escort,' had created confusion in earlier analyses. There is, however, one serious error. 'SBR' is not a ship, but a deperming station (Stantsiya Bezobmotochnogo Razmagnichivaniya).

All in all, however, this *Guide to the Soviet Navy* is a work of truly monumental proportions. With its bibliography of suggested readings, it is a practically unending source of information for those interested in the USSR generally and its navy in particular.

A. H. SKINNER

Marblehead, Massachusetts

EDWIN DORAN, JR., *Wangka, Austronesian Canoe Origins* (Texas A & M University Press, 1981). 10½″ x 8¾″, cloth, 111 pages, line drawings, photographs, index. $15.00.

The author provides an updated descriptive and distributional analysis of Austronesian canoes and, while acknowledging his indebtedness to A. C. Hadden and James Hornell (Canoes of Oceania, Bishop Museum, Honolulu, 1937) he goes on to do what they and few others have bothered to do; that is, develop an empirical understanding of the sailing qualities of Pacific canoes and incorporate this information into his analysis. From rafts and dugouts to the large, double-hulled canoe now no longer extant in Polynesia except through modern analogues such as the Hakule'a tested in 1975 and 1976, the author takes the reader on a logical, inductive voyage both temporal and geographical to establish his tenet that the double canoe is the earliest Austronesian boat type and that it was followed by the single outrigger and, most recently, by the double outrigger canoe.

Readers interested in maritime history and practicing sailors will appreciate the sail and deck plans, end views and lines of the principal canoe types as well as the author's description of tacking and shunting techniques and sail types. All readers, however, will acknowledge the author's significant contribution to the study of Austronesian canoes through his compilation and analysis of their specific sailing qualities. In chapter five, titled 'Seaworthiness of Austronesian Canoes' thirteen 'somewhat arbitrary components all contributing to' the seaworthiness of canoes are discussed and herein lies the author's principal contribution.

PETER FETCHKO

Salem, Massachusetts

RICHARD A. GOULD, Editor, *Shipwreck Anthropology* (Albuquerque: The University of New Mexico Press, 1983). 6⅛″ x 9¼″, cloth, xiv + 273 pages, illustrations, maps, references, index. $27.50.

In 1966, *Archaeology Under Water* by George F. Bass was published, providing the first comprehensive descrip-

tion of scientific archaeological work under water. This landmark publication argued persuasively that proper scientific investigation of submerged archaeological sites was both desirable and necessary for a complete reconstruction of past civilizations. *Archaeology Under Water*, supplemented in 1972 by *A History of Seafaring Based on Underwater Archaeology*, remained the standard text on the subject until the publication in 1978 of *Maritime Archaeology* by the late Keith Muckelroy. Drawing upon the rapidly-growing body of theoretical and methodological knowledge within the newly-emerging field of underwater archaeology, Muckelroy examined existing data from underwater sites in terms of current anthropological methods of inquiry. He then went beyond those data to pose broader questions and to link underwater archaeology with the established disciplines of history, archaeology and anthropology. Now, with the publication of *Shipwreck Anthropology* we have, neatly packaged, a series of papers, most calling for the complete integration of underwater archaeology into the discipline of anthropology. (It is very fitting that this volume is dedicated to the memory of Keith Muckelroy, whose work inspired much of the current theoretical discussion.)

Shipwreck Anthropology, edited by Richard A. Gould, is a compilation of papers from a 1981 seminar conducted by the School of American Research. Of their purpose Gould states: 'While in no sense downplaying the value of earlier work done in the field of shipwreck archaeology, this seminar points the way to new and perhaps wider applications within this field.' The volume includes contributions by the editor, Patty Jo Watson, Daniel J. Lenihan, Larry Murphy, George F. Bass, Peter R. Schmidt, Stephen Mrozowski, Mark P. Leone, Cheryl Claassen, Wilburn A. Cockrell, and E. Gary Stickel. Historical, classical and anthropological viewpoints are presented, each illustrating ways in which the study of shipwrecks illuminates our understanding of our maritime heritage and, therefore, improves our general understanding of the past.

Although several of the authors, especially E. Gary Stickel, discuss practical applications of anthropological methodology to shipwreck studies, others drift into arguments that parallel those being aired in terrestrial archaeological circles: arguments echoing the tired phrase, 'archaeology is anthropology or it is nothing.' This slogan often is voiced by those anthropologists who feel that the mere excavation and reporting of archaeological sites is the work of 'historical particularists' who contribute minor facts about the past, but little towards a better understanding of past human behavior. George Bass' paper is a convincing reminder that meaningful deductions rely more upon the recovery of valid data than upon the formulation of a research plan based upon often-unrealizable anthropological goals. He asserts that it has been 'historical particularists'—a term often used with derision by anthropologists—who have made the major discoveries concerning ancient seafaring and that archaeology should not be so shackled by prior research designs that intuitive thought is stifled.

Bass clearly defines the need for continued 'particularistic' research, pointing out that '. . . nautical archaeology desperately needs decades of cataloging and categorizing shipwreck remains, for we have so few comparative data with which to work.' The inadequacy of the current nautical data base is made evident in several of the papers, especially those by Gould, Schmidt and Mrozowski, and Cockrell; the authors develop excellent anthropological hypotheses but, in the end, must admit that effective testing of these hypotheses must await the availability of additional archaeological data.

Papers by Leone and Stickel come closest to linking anthropological methodology to field data in their analyses of, respectively, a survey of the Patuxent River in Maryland and submerged stone objects near the California coast. In both cases a large body of data is available and amenable to such analysis.

The remaining papers suggest frameworks for the integration of shipwreck archaeology with anthropological methodology. Gould summarizes the papers with a list of prime considerations for further work, including more systematic and explicit planning, execution and analysis; increased diversification and selectiveness of site types under study; and concentration on use of shipwreck data to pose generalizations about past and present human behavior. This last consideration was the key agenda item at the seminar, and may have been best expressed by Larry Murphy: 'The archaeology of shipwrecks should be not merely the embellishment of the maritime historical record, but the elucidation of otherwise unattainable aspects of human behavior.'

Shipwreck Anthropology is an important book for two major reasons: the volume offers challenges and sets standards for future shipwreck studies; at the same time the combined papers produce a concise snapshot of current archaeological factionalism as it relates to underwater archaeology. The participants seemed to agree with Patty Jo Watson, that 'the logical response to the debate between generalists and particularists is always the same: both emphases are essential and both are present in everyone's work.' Therefore it seems clear that all dis-

ciplines should cooperate in the development of definable goals which will maximize the results from excavation of the dwindling archaeological data base. Whether the various theses in the book are adopted, they all warrant consideration by those investigating underwater archaeological sites.

An important side issue emerged from the seminar, an issue upon which there was unanimous agreement and which prompted the participants to prepare a formal statement that is included as a preamble to the book: the problem of increased looting of shipwrecks for profit. The preamble is a plea for the protection of historic shipwrecks, without which most of the proposals presented in the book cannot be pursued.

JOHN D. BROADWATER

Yorktown, Virginia

FRED M. WALKER AND ANTHONY SLAVEN, Editors, *European Shipbuilding: One Hundred Years of Change* (London: Marine Publications International Ltd., 1983). 8¼″ x 11½″, paper, 216 pages, illustrations.

This is a compilation of nineteen papers presented at the Third Shipbuilding History Conference held at the National Maritime Museum, Greenwich, in April 1983. Edited by Naval Architect Walker of the Museum staff and Professor Slaven of the University of Glasgow, the publication covers many aspects of shipbuilding in Europe, particularly Great Britain, Norway and Sweden, over the past century. The papers are of high quality and scholarship and of such variety as to offer absorbing reading to practically anybody who professes an interest in maritime history. Some papers are more highly technical than others but most are easily understood by the non-technical reader who will gain a broader grasp of a complex industry which has been blown first one way and then another by the changing political, military, and economic winds.

A remarkable comparative analysis of two naval vessels is presented, one a battleship of 1906, the other Britain's first nuclear submarine. Both are named *Dreadnought,* and one might well suppose that to be their only similarity but the comparison of the problems of design and construction and their respective solutions is quite fascinating. American readers will be gratified by the generous credits given to the United States Navy and particularly Adm. Hyman Rickover for making available the United States-built nuclear reactor plant and propulsion machinery which permitted completion of the submarine years sooner than would otherwise have been possible.

Maritime history buffs will be caught up in the description of the 'reconstructed engine for the S.S. Great Britain,' the great iron ship launched at Bristol in 1844 and now being restored as a museum piece in the very dock where she was built.

Readers are led through a concise yet comprehensive study tracing the major improvements that characterized each of the ten decades in the technical and economic efficiency of merchant ships.

Professor Slaven presents a clear but distressing analysis of 'Management Policy and the Eclipse of British Shipbuilding' which he describes as a 'classic example.' Concluding his excellent paper, he observes, 'The history of British shipbuilding clearly demonstrates that industries which plan for stability and neglect growth eventually invite extinction.'

Two Finnish authors collaborate on a review of the development of icebreakers from primitive types which appeared in the mid-nineteenth century to the latest designs of today.

The replacement of riveted ship construction by arc welding is called a 'quiet revolution' in a remarkable history presented as one conference paper. The antagonisms and protectionist obstacles which had to be overcome by welding after the technical problems had been solved delayed its general employment until the needs of World War II forced its use. The technical advances since that time have made practical the construction of the enormous tankers and bulk carriers afloat today. Yet, says the author, 'Once again the industry sits in the doldrums. . . . The "quiet revolution" has actually had a number of points at which the wheel spins rapidly before standing still once more. Who will say that we are not poised for such a jerk forward in the late 1980's?'

Another paper traces the history of education and training for shipbuilding over the years during which craft apprenticeship and empirical methods have given way to naval architecture and engineering.

An accountant shares his view of shipbuilding between the wars in a paper based on the experience of The Fairfield Shipbuilding and Engineering Co. Ltd. and an executive of Harland & Wolff Ltd. contributes an illustrated corporate history of that eminent century-old firm.

The role of the diesel engine in shipbuilding is described by a Danish builder of such engines and carries the reader rapidly from 1898, when the first experimental

engine was built, to the reliable and highly sophisticated designs of the present time.

Trade unionism and industrial relations in both British and Swedish shipyards are covered by two papers.

A Norwegian author provides a picture of the transition from wood to steel ship construction in Norway between 1880 and 1980.

The publication concludes with a paper by Editor Fred Walker entitled 'From Craft to Profession.' The title is apt and descriptive not only of the editor's contribution but of the entire conference at which it was presented.

CHARLES S. MORGAN

Concord, Massachusetts

BERNHARD KILIAN, *The Voyage of the Schooner Polar Bear* (New Bedford Whaling Museum; Old Dartmouth Historical Society and the Alaska Historical Commission, 1983). Cloth, 106 pages, 126 black-and-white illustrations plus 3 charts, no index. $25.00.

This is a 'fun to read' book. It avoids the boredom when logs or diaries of sea trips are printed virtually intact; yet it is a diary of a whaling trip to the Arctic.

The secret of this book's success is the skillful and loving editing done by John Bockstoce, curator of ethnology at the New Bedford Whaling Museum. This thirty-eight-year-old archaeologist has spent his past twenty-five years on visits of varying length in the western Arctic areas. A graduate of Yale, he received his doctorate at Oxford. The book has been made successful by Bockstoce's editing, not only of the diaries but of the pictures. More than that, he wrote a long introduction that is an outstanding summary which helps the reader know what the book is all about.

The schooner *Polar Bear* went whaling to the western Arctic in 1913 and she had enough characters on board to make the telling of her story a lively document. One unique feature is that the schooner's 1913 trip was the first time still and motion picture photographers went on a whaling voyage, with the result that the 126 black-and-white pictures in the book not only show Arctic whaling in a realistic way but the pictures document the wintering-over by the crew when *Polar Bear* was caught in the ice. These still pictures were taken by twenty-year-old Bernhard 'Ben' Kilian whose diary upon which the book is based indicates that he was a shrewd observer and an excellent reporter. Kilian, in his nineties, was still alive in early 1984. With Kilian (chief engineer for the schooner) was his brother Hermann, assistant engineer and these two young men of German descent seemed to be natural-born mechanics. Also on board were five Harvard students who wanted to try Arctic hunting. Additional crew members were added in the Arctic when the whaling experts came aboard. The schooner got caught in the ice and the crew built a house ashore for their winter quarters. The owner of *Polar Bear,* Capt. Louis Lane, had to go back to Seattle on business and two of the Harvard students went with him for a two-month journey across the Brooks Range to Fairbanks. One of the students, Dunbar Lockwood, kept a diary of this overland journey and his diary, excerpted, forms a fitting conclusion for the book.

Without intending to do so, the book makes a fine guide to the western Arctic and to surviving the tough life there.

This review would not be complete without reference to a poignant item about Stefansson's son Alex. The boy's mother Pannegabluk, an Eskimo woman 'with a very good sense of humor,' served as a seamstress for a Stefansson expedition and Alex was part of the expedition's results. Ben Kilian was quite surprised to see Pannegabluk's children, all with dark skin and black hair except one with blond hair and blue eyes. Pannegabluk said this was her child by Stefansson.

JOHN F. HERBERT

Boston, Massachusetts

DAVID B. QUINN AND ALISON M. QUINN, Editors, *The English New England Voyages, 1602-1608* (London: The Hakluyt Society, 1983).

Students of maritime history are so accustomed to reading first-rate scholarship produced by D. B. Quinn that it should come as no surprise that his latest effort for the Hakluyt Society only adds lustre to an already exceptional reputation. It is fortunate from the reviewer's perspective that *The English New England Voyages, 1602-1608* is a work of distinction, for evaluating an edition of printed primary materials and manuscript letters is fraught with perils. Most of the standards ordinarily used to measure the quality of an historical work are inadequate or inappropriate. Indeed, a very different and demanding set of criteria must be used in the evaluation of edited works than is the case with narrative or analytical prose accounts of individuals, institutions or

events. Most obviously, an edited book is judged first on the conceptualization of the project. Is there a need, a real reason for undertaking it? Second, the work must be evaluated on the basis of its coherence and execution. Are the materials chosen thoughtfully and organized to achieve maximum effect? And finally, the publication should be judged by the criterion of whether or not the editor has actually added anything worthwhile to the corpus of Western knowledge. Too often, scholars who undertake editorial projects do not think about these criteria or do not have sufficient respect for them. To the ambitious, the edited work is an impressive publication that is much easier to produce than a monograph which entails the pain and labor of extensive research and repeated prose revisions. For others, the editorial project is effectively a hobby horse whose significance is apparent only to the editor: ultimately a waste of paper, ink and library shelf space. But, occasionally, editorial projects are undertaken by scholars such as the Quinns, whose intelligence, taste, sensitivity and decades of experience raise the edited work to the level of an art form.

Ordinarily, books of this type are judged almost entirely on the basis of need for the project and selection of materials. A secondary consideration is, of course, establishment of and adherence to editorial principles that not only reproduce the documents accurately, but also explain obscure references and clarify difficult points. These requirements are met quite satisfactorily in *The English New England Voyages*. The selections include a thoughtful mixture of early seventeenth century published works such as Brereton's *A Briefe and True Relation* and Rosier's *A True Relation* as well as various manuscript materials ranging from letters in the Cecil papers at Hatfield House (Raleigh to Sir Robert Cecil, 21 August 1602) to those in the Plymouth City Records (Plymouth Corporation to Sir John Popham, 11 June 1606). But the principal virtues of the work do not, curiously enough, lie in the selection of materials and adherence to editorial principles. They appear instead in the lengthy Introduction and also in the Quinns' decision to include an ethnography section on eastern native Americans.

The Introduction is a delight to read, for in it the Quinns have incorporated a lifetime of scholarship, thought and experience. There is a smooth, flowing quality to the prose, based largely on confident understanding of the subject, that leaves the reader struck both by the breadth and depth of the editors' knowledge. At the same time, there is clear evidence of timeliness in the work in the inclusion in both the Introduction and the document selections and appendices of information about the impact of native Americans on the early English colonists. In sum, the editors have achieved something very difficult in the main strength of their book: an impressive blend of wisdom born of years of reflection combined with a current dimension of modern cultural anthropology which results from their awareness of the latest research bearing on their topic.

The book is not altogether free from flaws. There is an occasionally disquieting tendency of the editors to rely too heavily on the paleographic skills of earlier editors in reproducing documents from the various manuscript collections. Additionally, the Quinns might have tried for a better balance between maps and plans on the one hand and holograph letters on the other when they organized their photographic reproductions, for there seems to be an overabundance of the former. These technical criticisms are, however, minor ones that have more to do with matters of taste than canons of scholarships.

This is a first-class editorial work that anyone interested in maritime history can read with pleasure and profit. Its faults—putting too much trust in other editors, and leaning too heavily towards schematics rather than letters in the documentary photo-reproductions—are negligible. Its virtues, in contrast, are many, and the editors have every reason to be proud of their accomplishment.

RONALD POLLITT

University of Cincinnati

CHARLES R. SCHULTZ, *Life on Board American Clipper Ships* (College Station, TX 77843: Texas A & M University Sea Grant College Program, 1983). 9″ x 6″, paper, 32 pages, illustrations. $1.00.

This delightfully informative and handsome booklet provides the reader an unvarnished understanding of what it was like to serve before the mast in an American clipper ship during the mid-nineteenth century. It concerns itself with how he lived, what he ate, how he met the natural perils of the sea, how he used his spare time, and deals not at all with 'bucko' mates or brutal masters (if indeed such there were on the true clippers).

The author is university archivist at Texas A & M and for several years before that was keeper of manuscripts and librarian at Mystic Seaport. In ten concise paragraphs he establishes just what clipper ships were and

how they got that way. Those introductory paragraphs conclude with this sentence: 'All of these factors caused the clipper ship era to end about 1860 as quickly as it had begun only a decade earlier.'

The story is largely based on and quotes liberally from many firsthand accounts by literate sailors, both published and unpublished, and the whole has the ring of authenticity and reliable scholarship. These sources are well identified by footnotes. A glossary helps the novice reader to understand unfamiliar nautical terms and suggestions for further reading are offered. Illustrated by three monochrome reproductions of paintings of clippers in foul weather conditions, the booklet also presents a highly useful chart of the world's oceans, tracing the principal clipper ship sea routes and average passages, redrawn from the endpapers of Cutler's 'Greyhounds of the Sea.'

CHARLES S. MORGAN

Concord, Massachusetts

WILLIAM W. WARNER, *Distant Water. The Fate of the North Atlantic Fisherman* (Boston: Atlantic Monthly, Little Brown, 1983). xii + 338 pages. $17.95.

There are many hard and dangerous ways to make a living. Few are worse than fishing in the North Atlantic. For the nonbelievers a few moments with *Distant Water* ought to convert them so that they too can read and be moved by the Spanish seaman's prayer,

> You who rule the sea and the shore,
> making the calms and the tempests, too,
> grant us thy mercy, O Lord,
> Thy mercy, O Lord! Lord, mercy!

Those distant waters about which Warner writes so eloquently 'form a great semicircle, a broad archway spanning the North Atlantic. The arch begins near Cape Cod in the New World and bifurcates as it approaches the Old, with one arm dropping south to the British Isles and the Bay of Biscay and the other going north around Norway's North Cape and east into the Barents Sea.' It is a vast area into which fishermen have been drawn for more than half a millennium by the promise of cod, halibut and herring. Indeed, it was the prospect of rich fishing that attracted many adventurous souls to venture westward until they met the inconvenient landmass of North America. For the next several hundred years aside from improvements in methods of propulsion, sail to steam to diesel, little changed in the way these men did their business. The handline gave way to the longline, which in turn declined in favor of trawling, but still much remained the same. Vessels put out from home ports off to the banks to harvest their catch. Once on board the catch had to be sorted, cleaned and stowed, either in ice which meant a short voyage and a quick return, or salted down permitting a much longer stay at sea. The crack of the canvas gave way to the 'plompf-plompf' of the diesel but the rhythm of the fishing cycle remained constant.

Two men unknown to each other, neither of them fishermen, destroyed this cycle and changed forever the nature of distant water fishing. One was an American, Clarence Birdseye, who with his associates invented in 1933 the multiplate freezer. Birdseye's invention was a great improvement over previous freezing methods; not only did it preserve the taste and texture of the food being frozen but also it was done with a machine small enough to be relatively mobile. Birdseye's technical success coupled with his adroit marketing expertise made 'fresh frozen' foods acceptable table fare in the consumer market.

The man who took Birdseye's idea to sea was an Englishman, Capt. Christian Salvesen. Salvesen was a whaler who in the years following World War II was prescient enough to see the end of whaling and perceptive enough to appreciate the advantages to putting a freezing plant aboard a trawler. In March 1954 Salvesen's *Fairtry* was launched. To the old-timers she was a revolution. Not only was she larger than any other fishing vessel (2,600 gross tons at a time when the largest British trawler was 700 gross tons), but she also trawled from the stern rather than the side and, perhaps most importantly, deep in her bowels she had sophisticated machines for processing fish and a quick freezing plant to preserve them. The installation of specialized machines made by the Nordischer Maschinenbau Baader, a small firm in Lubeck, West Germany, proved to be critical. For with these machines *Fairtry* was able to process quickly the huge amounts of fish brought in over her stern and to process them in a way where waste was reduced to almost nothing.

Her first time out *Fairtry* headed straight for the Grand Banks off Newfoundland. Although they had been fished for hundreds of years these waters still remained rich in cod and that was exactly what *Fairtry* hunted. The results were astounding. In one early voyage she took 2,000 tons of fish which she was able to process into 650 tons of cod fillets in little more than a month. Such a triumph was worthy of imitation and in July 1956 while trawling on the Bank the crew of *Fairtry* were shocked to see

steaming towards them their mirror image, exact in almost every detail save her flag. She was the Russian factory trawler *Pushkin*. The age of the factory trawler was at hand.

It is life aboard these vessels that concerns Warner. He is clearly at his best describing the individual men and women at work harvesting from the 'fish store' beneath the waves.

In 1977 and 1978 Warner visited and lived aboard three factory trawlers (he never makes his process of selection clear): the West German *Wesermunde*; the Russian *Seliger*; and the Britisher *Kelt*. A fourth visit was made to *Terra*, a Spanish pair trawler, who along with her sister *Nova* specialized in salted cod.

Despite differences of national character and diet (all the stereotypes come through, from the bland English food to the emotional Spanish temperament) one is struck by the fellowship of the sea. To a man and woman the officers of these vessels are professionals, people who know the sea and fishing. They are aboard by choice and seem dedicated to their work. Well regarded by their crews, they govern with skill, experience and intuition.

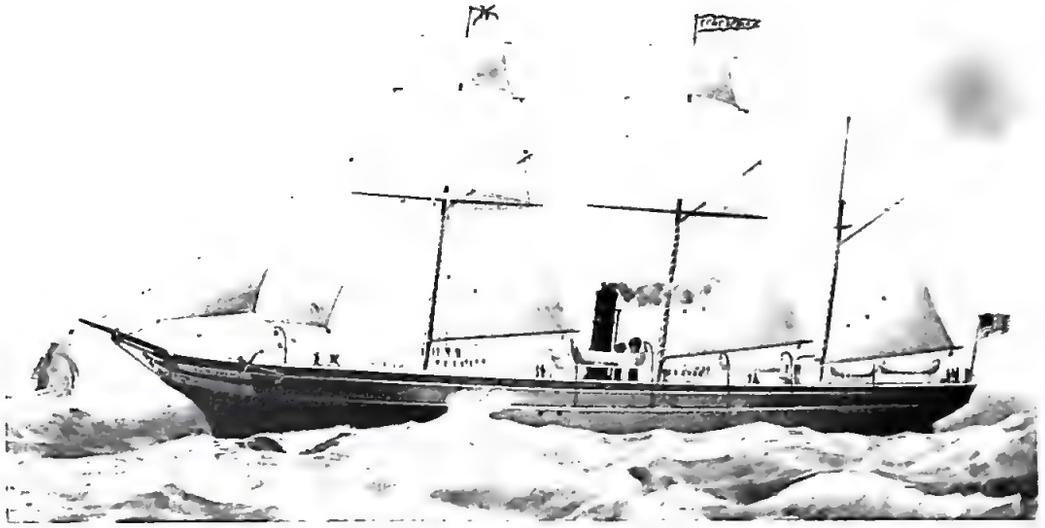
The world below the bridge is a different matter. Here, young men and women (the 'old' fisherman is a rarity) seem despairingly familiar. They are factory workers gone to sea. Indeed, the image of the fisherman standing at the wheel garbed in oilskins ready to dodge in a heavy sea is an image from the past. On the great fish killers the crew are as likely to spend their time below at filleting and freezing machines as handling chores on deck. One abiding image is that of the young Russian chambermaid on *Seliger* ordered to go below to assist in processing the catch. There she stands in the hold—'fish scales flew into her face, stuck in her hair, and spattered all over what was surely her best sweater.' In fact, even the injuries aboard are more the product of the factory than the sea. Although no statistical inference should be drawn, most of the shipboard injuries Warner describes take place not on deck but in the factory area where the phenomenally fast cutting machines pose a hazard to everyone.

Warner's depiction of the machine gone to sea is not well drawn. In his attempt to draw a fine portrait of individuals he misses the opportunity to tell us more about the collective experience. He is more interested in relating what they had for lunch and repeating anecdotal stories from the ward room than in addressing more important questions about the relationship of men, machines and the sea.

Ironically, Warner's elegant portrayal of life in distant waters comes at the moment of its collapse. The very success of great factory trawlers made them appear not as harvesters of the sea but as rapists who came to take and destroy. To what degree they were responsible for the rapid depletion of fish is a question still debated. What is not debatable is that for good or ill they were blamed and their presence accelerated the demand for what has come to be called the 200-mile limit. In 1976 the United States enacted the Fishery Conservation and Management Act, a piece of legislation which has effectively excluded foreign vessels from American waters, now defined as extending out to 200 miles. Other nations have enacted similar restrictions. With 'no fishing' signs posted in the world's richest grounds the distant water fleets became economic albatrosses, able to be supported only where factors other than simple profit and loss were paramount.

The result, according to Warner, is hopeful. The elimination of the large mechanistic world of the great factory vessels has meant a return to the smaller world of the local fisherman. Warner ends his book almost where he began it, on the deck of *Tremont*, a conventional Boston trawler. When we first met *Tremont* she was in trouble competing with the foreign boats; now some years later we are told that the future looks bright and that 'the sea seems newly alive.' Perhaps.

WILLIAM M. FOWLER



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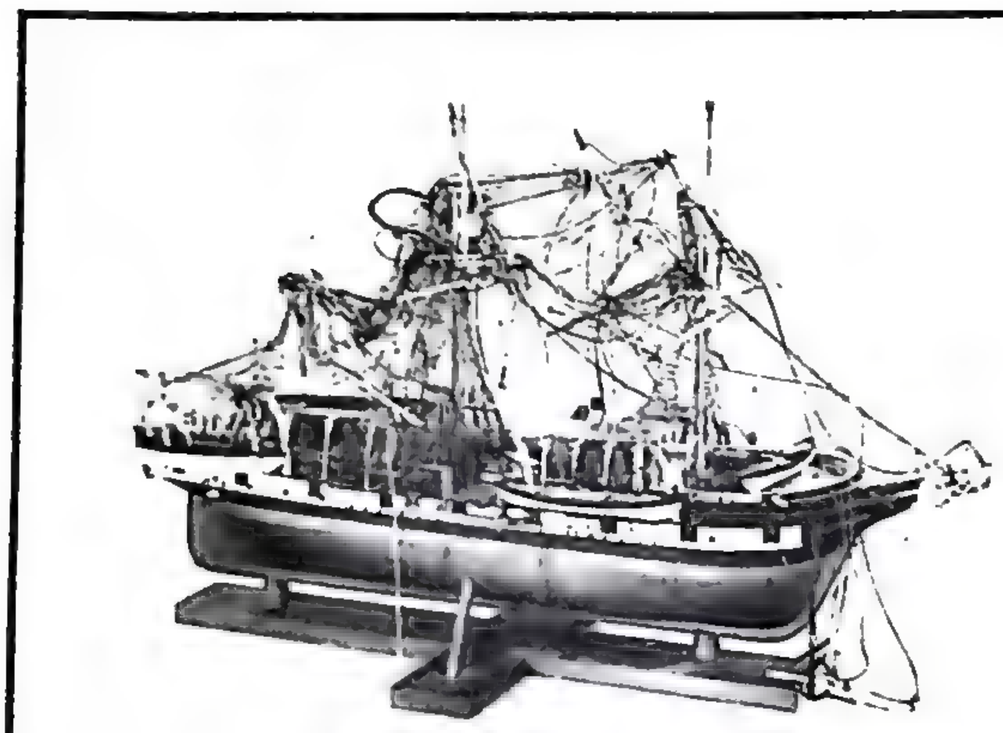

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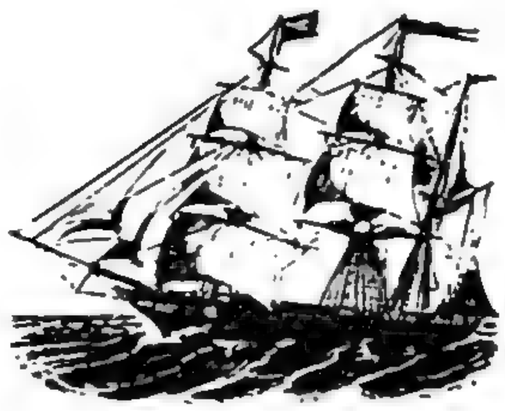

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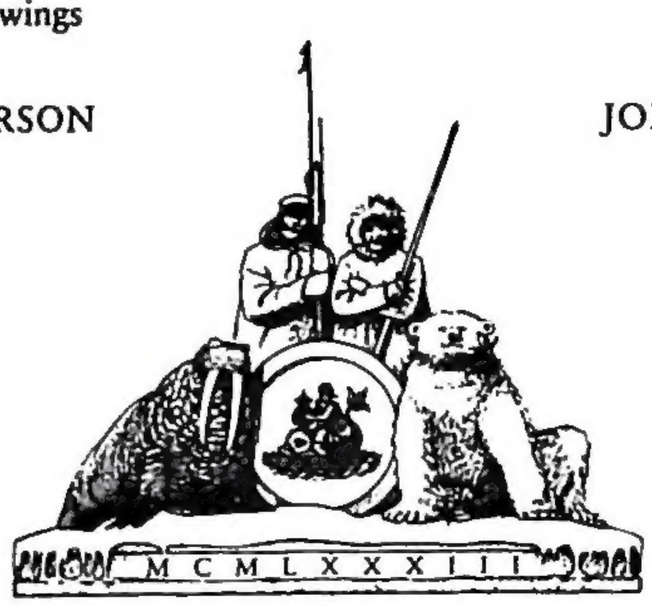

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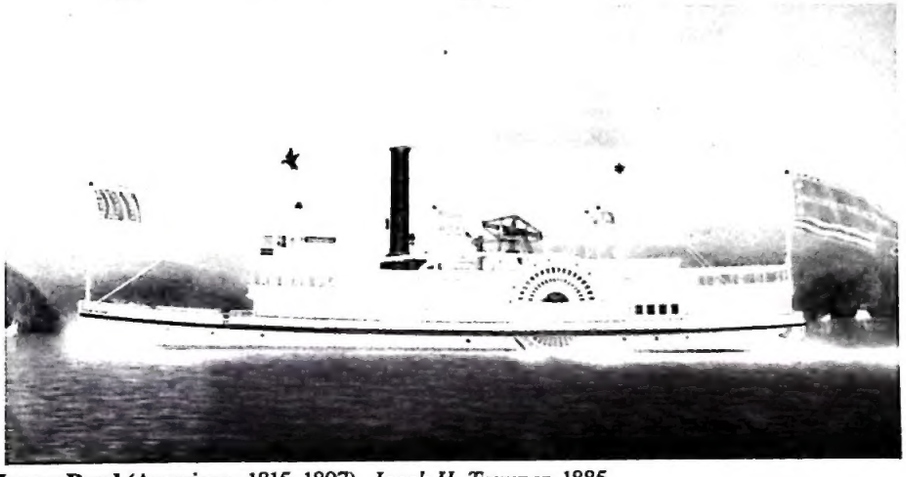

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